

Call. 482

1877-79 (5)

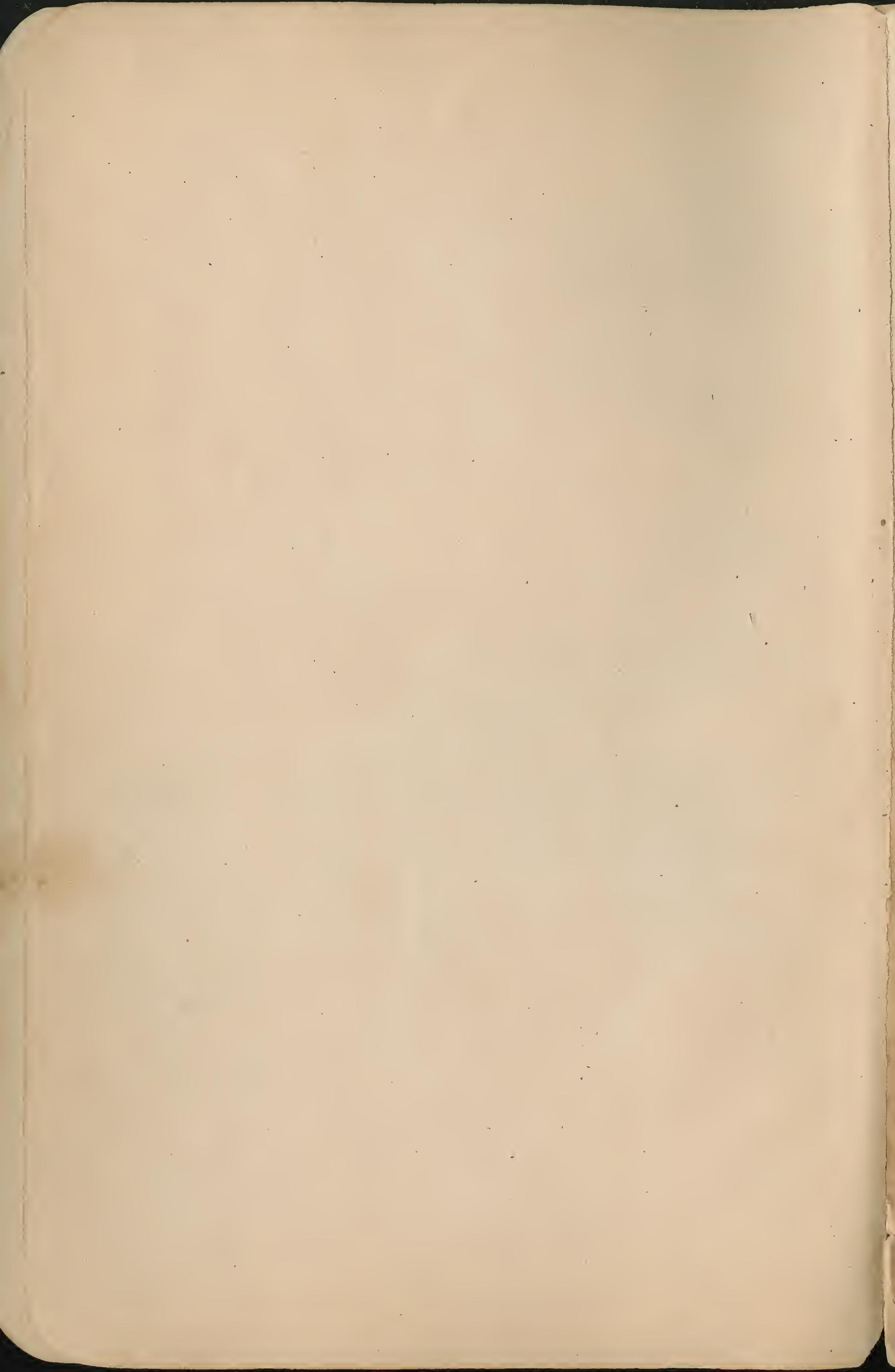
1865-87

A

A

Call. 482 (5)

1877-79
1865-87



Fort Bridger, Wyoming I. July 24, 1877
In water from a pool with abundance
of *Fontinalis*.

Difflugia pyriformis  of coarse stones.

Difflugia globularis  of yellowish
particles and siliceous grains

Difflugia manuspiformis  of same
construction as last. common, of coarse stones.

Difflugia with trilobate mouth - of stones.
Also a variety as represented in figure of
July 24 composed of thin transparent plates of
various forms & sizes, with double intlined dotted
intervals. See account of July 30th.

Echinopystis of several varieties

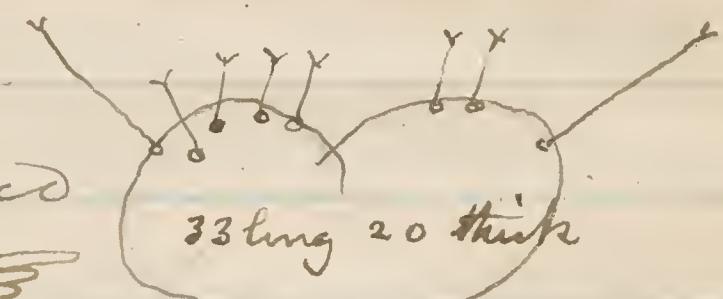
Arcella vulgaris. Hemispherical form
with cupped depression, various shades of
color, common. No tubercles on mouth
Arcella of discoid form and large mouth,
cream beneath and slightly rounded margin.
Common.

Cyphoderaia margaritacea.

Euglypha alveolata - spineless

Trinema acicula.

July 25. *Echinoecystis viridis*. In same water
as foregoing. Fine green color and active
movement. Individual No 1. Appeared only to
have one kind of spines, and those the long ones
which appear scarcely furcate at the far end.
The spines were thickly crowded and clean at base.
Body slightly changed in form from the sphere.
Indiv. No 2 Similar but with the spines more
distinctly furcate.

An empty skin discovered
as represented in figure: 
Colorless. Thickly covered with short & furcate spines
about 4 long and the fucation 1 division, the few
and large spines from 10 to 15 with fucation about
half extent of small ones. Disks at base scarcely 1
in diameter. No 7 S. H.

A second dried, width 30 by 20 with spines
as in former.

Arcella vulgaris, Helmiphenine captured on
surface 13 wide 8 high, mouth 3 high & 3 wide
with No 7 - Cinnabar form. Various hues of
brown.

Anuclea - binary like ~~oaf~~ 20 by 10.
no nucleus observable. In progression the pseudopods appear as abrupt heonia-like protrusions first on one side & then the other of the free part & then in advance. Vacuoles confined to posterior two thirds. Extrorse finely granular with coarse ones, and also darkly defined oil-like globules scattered throughout. *Anuclea zonalis* observed.

Lecythisium hyalinum? 8-8- at position of mouth 4 wide, mouth 2? nucleus 4? nucleoles 1½ dark granules at middle of extrorse ½. Frequently large globular masses of sarcodite protruded from mouth containing vacuoles & fine granules.

Fig. 1 of July 25. As first seen. Middle space of extrorse with a zone of darkly colored granules ½ diam. Protruded sarcodite with large vacuoles, which changed from time to time. Fig. 2 had a smaller ball of exuded sarcodite. Fig. 3. The protruded ball of sarcodite gradually enlarged to size of the parent, and then contained four large vacuoles from 3 to 4 diam. also an oval one in neck, which became pear shaped and finally globular as it was extruded from the parent into the protruded sarcodite. The latter enlarged so as to exceed parent measuring 9' its vacuoles diminished to 3 large ones, of which largest was 6 diam another 5 & the other 4.

Cyphodera. with  tent about half occupied by saccula the fundus of which attached by a single thread unsymmetrically on one side as in outline.

July 26. *Acanthocystis*, shell. See drawing. It was crowded with long and short fuscate spines. Ovoid, whitish 35 by 25, contained a few scattered green grains about 1 diam. Also an oval ovum-like body 19-9 with faint reddish brown granular contents.

A heliozoan in all respects resembling *Acanthocystis viridis*, but with the spines not distinctly ending in a forked manner. They appear thickened at end but not fuscate. Another heliozoan of globular form, soft, finely granular and faintly reddish aspect 5 diam. with few delicate soft rays as long or $1\frac{1}{2}$ times as long as diameter of body. Has it any relationship with the ovum like body above mentioned.

Corycia. Perhaps observed. Could detect no contractile vesicle.

Trinema acinus. Individual seen with an internal ovum like body, covered with scales similar to that previously seen in *Euglypha alveolata*.

Euglypta alcedata. Fragment, very abundant form. Small variety and spinelus, usually with two intermediate forms to mouth. Often with an appearance of scales within around the periphery of the nucleus. A fragment of a test clearly exhibited the constituent scales as oval 2 by $1\frac{1}{2}$.

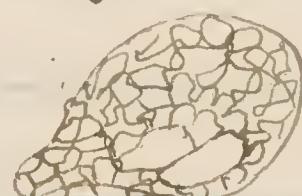
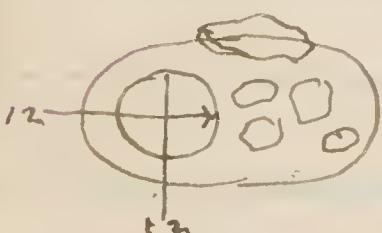
Difflugia accuminata [] not unfrequent, of coarse stones. Small form 25 long 13 broad & 8 at mouth
Difflugia pyriformis with green interior and built of coarse stones.

D. globularis with large diatoms attached. []

D. vulgaris. Oval 15 by 13 mouth 4 circular pseudopods to 25 long by 1 wide.

A smaller one 11 long 9 wide and 3 at circular mouth

D. marsupiformis



30 long 20 high

19 long at base mouth 12

30 by 20 = of large and small stones.

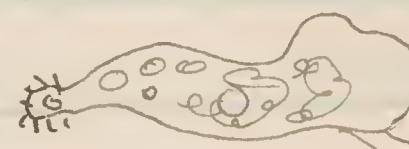
Arcella [] Concavo-convex discoid 28 broad 6 high mouth 3 high 11 broad. no tubercles around mouth. Appeared to have several nuclei and many contractile vesicles.

Another 25 broad 9 high - mouth 3 high 10 wide, no tubercles. Another 23 - 7. mouth 3 high 8 wide.

Euglypha glovera - Oval form

Anuclea radiosa

Anuclea resembling A. quadrilineata without
lines 12 by 8 cent. res. 3. Extosome advancing
the entosome rolls in concert extending about
 $\frac{4}{5}$ length, & consists of fine granules with scattered
oil like globules. Nucleus not determined.

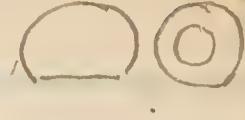
Anuclea. Linear like  25 by 10 in
front & 4 behind. nucleus 2, vacuoles 1 to 2
c.v. posteriorly to 3. With posterior minute villi
long & very persistent. 

Anuclea quadrilineata? With a pair of lines only.
July 27th.

Euglypha alveolata. Two spineless individuals
observed, each closed with an operculum
and containing an ovum like body. The
ovum was covered like the test itself. The
globular body within enclosed in a membrane
had uniformly granular contents.

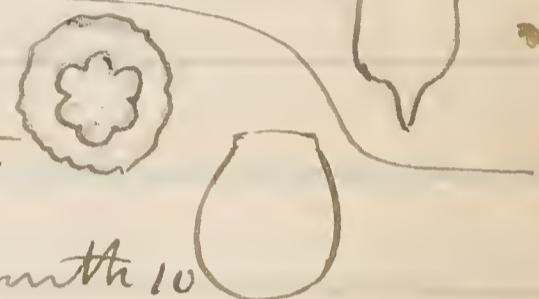
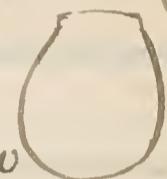
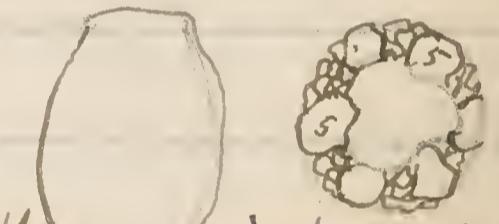
E. alveolata An empty test 18 by 9. and 5 at
mouth with 3 intermediate prints or apparently
eight in all. As in all others thus far observed
spineless. The second row of scales denticulate
like the first row.

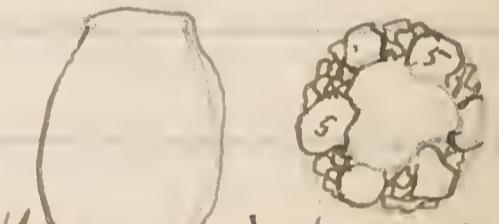
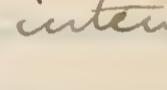
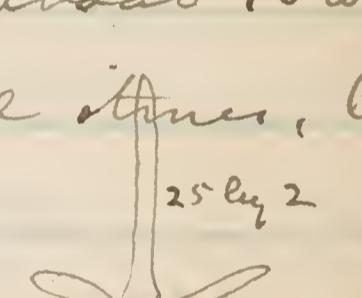
Euglypha compressa, with lateral spines.

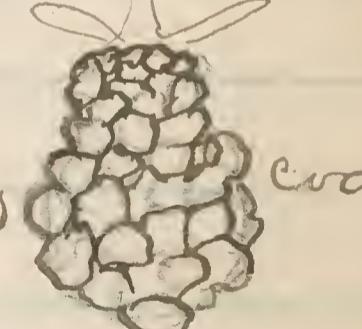
Diffugia globulans - Hemispherical form 
Yellowish granules and granular particles 9 broad
7 high - and 9 wide below (with $2\frac{1}{5}$).

July 28th.

Diffugia acuminata. Of coarse and fine stones
58 long 25 broad near fundus, 18 at mouth:

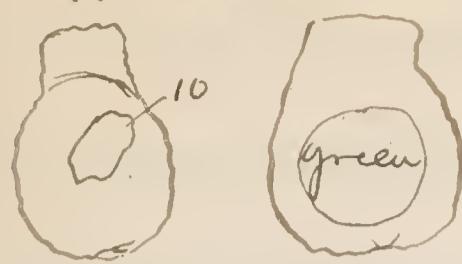
Diffugia with six-lobed mouth 
frequent. 30 long 25 broad mouth 10 
Pseudospots three or more 30 or more long by 2 wide
Several individuals 33 long 28 wide mouth 12. 

Diffugia with trilobate mouth 
oval, large stones to mouth with  intervals
filled with small ones. 35 long 25 broad 10 at
mouth. Lot of large and small stones, but
surface rather even. 

Diffugia pyriformis, of remarkably
stones, thus three only across neck.
30 long 24 broad and 10 at mouth end. Stones 4 & 5.
Sandstone within fundus appears bright
green 

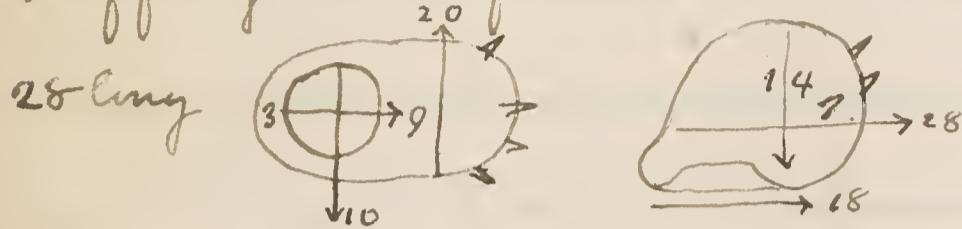
No 32-22-5 - also of large stones.

Diffugia subpyriformis. not uncommon



27 long 20 wide neck 4 long 11 wide
of coarse and fine stones.
unsymmetrical.

Diffugia - of stones and dirt.



Orange colored Heliocozon - See drawing of date.

Body 11, colorless under 1, ordinary rays length
of diameter of body, projected over about $\frac{3}{4}$
periphery; from the other part projected sucker
rays, 1 to 3 long - sucker about $\frac{1}{2}$ diam. Sucker
rays move in and out rather quickly and
animal moves in opposite direction or in
that of position of ordinary rays. Slight change
of form of body from round to oval &c. Orange
colored interior finely granular. No vacuoles
or contractile vesicles observed. Ordinary
rays few.

Actinophrys sol. Frequent, with large
vacuoles, diatoms as food, &c.

An individual observed, see drawing,
14 diam rays to 15 mm. Body finely
granular with no visible vesicles or
vacuoles. C.V. 5 at base 2 is high from surface
before it collapsed.

A green helizoon, like *Echinocystis*, but
the rigid rays not forcate. See drawing.
Body 12 rays 7 numerous, green granules up
to 1.

Another individual smaller with body 7 &
rays about same.

A similar in structure seen, but devoid
of the green granules. See over leaf.

Anuclea quadrilobata observed  July 6
The contractile vacule 3 changing in form as
usual in movement of animal.

July 29th

Actinophrys sol. See drawing. In state of
dissolution. The drawing represents appearance
when first observed, excepting that the nucleus
was not so distinct. The animal was
motionless and the vacuoles appeared almost
stationary, but several appeared slowly to expand
& become more prominent from the periphery.
Only five rays could be detected in different
places. After an hour the whole thing includ-
ing all the vacuoles had collapsed and
shattered except the nucleus which then
became very distinct & presented appearance
seen in drawing. It appeared to contain a central

nucleus. The rays has also disappeared. Body at first measured 20; the vacuoles from 4 to 7. The nucleus measured scant 6, the nucleolar shade or spot 2. The nucleus appeared uniformly granular. (No 75.H)

Cyphodocira - usually with the pseudos more or less abruptly narrowed. The figure is the common form. Usually from 25 to 30 long 11 to 12 broad and mouth 5. Misty gelatinous, sometimes completely colorless. Sometimes test replete; mostly only partially filled. Vacuoles from 2 to 3 abundant toward the mouth.

White *Echinocystis* like *Hedizonia* with stiff but not punctate rays. See figure 9.
July 29. Body 7 dir diam.

Actinophrys ad 15, rays to 20, about a dozen on same plane, 1 to 2 wide at base, vacuoles 3 to 4 numerous, C.V. 4, food vacuole 5, granules about $\frac{1}{2}$.
Difflugia with six lobed mouth, oval 30-25 with mouth 8, pseudopods three or more to 40 in length by 3 to 5 at base and 2 near end. Often with dark lined granules extending to end, elliptical taken 1 dir long. Common

Diffugia  of small & large stones & uneven
outline 23-12, 7 - acute at fundus, pseudopods
to 35 in length by 3 at base & 2 further on; also
protruding in palmate manner.

July 30th Diffugia. Of the peculiar character
observed first on 24th and seen a number
of times since. The test is oval and has a
slightly projecting quadrilobate mouth.
Composed mostly of tricus bodies 4 to 6 long and
1 wide, with rounded, oval and angularly ovoid
plates defined by interrupted or dotted
outline. The peculiar nature of these dotted
outlines undetermined. Test has a short
rim or neck 1 or 2 dir long. A specimen
measured 28 long 22 broad and had the mouth
8 wide.

July 31st

Diffugia vulgaris. Oval 20 long, 17 broad, mouth
with a rim or neck 1 long, mouth circular, 6 diam.
lumen edged, and of little stones, except occasionally
where a large one extended to the edge.
Another oval Diffugia test 29-23-9 with a
rim 1 long had the mouth circular but with
a public trace of the six lobed character. Edge
of the mouth lumen, of small stones interior, to
large ones extending to the edge.

Gyphoderia and *Zinema* the only two forms
observed with abundance of desmids and
diatoms found on *Ranunculus* (white flowered)
in swift stream of Smith's Fork.

Gyphoderia 28-10-4 nucleus & fundus
obtuse.

Difflugia accumulator of crane and intervening
small stones $\overbrace{10}^{55-28-12}$ on large stone
attached to side of triangle over 12 long & 10
wide at base. Another 30-14-8, with the point 5-2.

Difflugia quadrilobiformis 30.22.9 Animal
yellowish. Pseudopods protruded a half
dozen at once from 20 to 30 in length
and two thick. Animal appeared yellowish
internally from the food.

August 1st. 1877 $\overbrace{30-12-5}$ with No 7

Gyphoderia. With pointed summit to test.
Replete, sarcoplasm extruding into half the point.
The vacuoles at fore part are yellowish, some
with granular matter at center, others more
homogeneous. In this specimen the median
zone appeared opaque (black by transmitted light);
the posterior part whitish & finely granular but some of
the large darkly defined oil-like globules. Nucleus obscured from view.

Echinocystis-like heliozoon 11 diam - long rays 7 to 8,
short ones 3, blunt but not pinnate. A faintly
granular atmosphere at root of rays. Interior
of body with green and colorless grain about
1 div. diam. Not S.H.: Appearance of surface of body
as if composed of longitudinal elements, probably the bases
of the rays.

August 4th. Orange colored heliozoon with
Polysarcum, Hottentia. Spirostomum &c.
Body globular but changing to oval or ovoid
or somewhat irregularly rounded. The individual
of the drawing when globular measured 10 in
diameter but in moving over a filament
of Zygnea it became irregularly ovoid and
measured 12 by 10. Moved actively. In motion
the sucker rays protruded & retracted. There
were numerous on the side opposite direction of
motion of the animal but were few on the opposite
side where the ordinary rays alone existed.
In course of observation the surface of body at
some point or other would roll up or
rise in one or two nipple like processes. This would
occur from time to time and for a short period only.
The sucker rays protrude from any part of the

surface but were observed most numerously and actively moving opposite the direction of motion of the body, which slowly glided over the field. Body granular, and orange colored, but with a superficial stratum about 1 div. thick colorless. No vacuoles, contractile vesicles, or distinct mass of food were observable within the body of the Helcizon, nor could any trace of a nucleus be detected.

Difflugia with distinct and deeply tribbed mouth set rather even. of large and intervening smaller ones, nearly globular 24 by 23 & mouth 10. Diam. of the mouth 5 deep and 5 wide; points between sub acute or rounded. Edge of mouth brown.

Cyphodicta (J). The dark granules occupied about two thirds the extent of the sarcoplasm, reaching to the very borders and completely obscuring much the portion of which distinguished only by some light being transmitted.

Arcella vulgaris. Hemispherical, even.

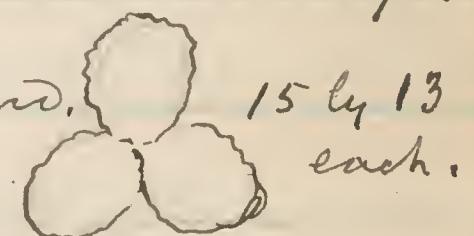
A. Eichhorni. 65 by 60 with 107. Rays few up to 25 long from surface of body. Superficial stratum of vesicles about 10 thick, on surface appear to be about half that width. The rays appear to start from the bottom of the large stratum of vesicles. The animal contained a *Brachionus* a *Panicularia* 32 by 4] another \odot 15 by 3, also several small diatoms, two vacuoles globular 10 diam, and a half dozen smaller ones some with green matter as food.

Diffugia observed with a distinctly 5 lobed mouth. Was active and presented half a dozen pseudopods. When first seen had mouth turned out & was difficult to make him retract. Length of test 28 width 25, mouth 10 wide. Surface colorless. Edge of mouth brown.

Two oval *Diffugia* in conjugation.



Three do observed. Form of mouth unknown.



Diffugia



vase-like 40-30-14 neck 1 long.

August 5, 77. A green *Heliogram*, abundant or rather frequent in spring-pools, in which grew *Polygonum*, *Kottmannia*, *Cheara*, *Fontinalis*; &c. Body firm 10 to 12 (not) usually about 11 with numerous delicate rigid rays up to 6 or 7, apparently blunt but not forcate, with few ordinary rays double length of others. With or without an atmospheric 1 thick of exceedingly minute granules. Movement of animal slow with slight undulation of form occasionally. Periphery of body colorless, apparently composed of disk to which rays attached. Interior of green globules which appear to form a thick stratum upon a colorless granular muscle, or in certain focus the center appears colorless. See drawing. Green globules up to 1 dm.

Arcella. Two large individuals observed in same water as preceding, in which also were many *Lymnaea*. The tests were brown, measured 64 wide 22 high with mouth 22 & elevated about one third of height with 8 to 7. Surface of test quite even. See figure.

Amoeba salicosa, *Pelomyxa*?

Oval, with a posterior circular disk which appeared at times in the faintest degree minutely illus, quite persistent. Animal quite sluggish in motion. Movement of a continuous slow rolling onward without pronation of pseudopods or extension forward of clear ectosarc; the granular ectosarc with its band of coarse elements following so closely that it appeared as if the advancing motion was due to an imperceptible contraction from behind so that the whole appeared to roll on without much change of form. Motion accompanied at times with shivering and corresponding thickening. Contents of fine & coarse granules with multitudes of quartz particles, small diatoms, yellowish dirt &c. Generally no vacuoles could be perceived, and if nucleus & contractile vesicle existed they were completely obscured from view. Once during observation a spherical granular body came into view which may have been a nucleus. Also in motion occasionally several vacuoles came into view. Size 42 long 25 wide and disk behind 7 with N.Y.S.H. See drawing.

August 6, orange colored *Heliozoan*. Lee Dunning.

When first observed it was globular 19 div.
No 7. with darker and ordinary rays all round,
the former 3 long the latter 5 long. Appearance of
a pale round or oval nucleus 7 div. Shortly
after protruded two short papilla like processes
of sarcodite with globules like the globules or
nucleus at the ends of rays. Shortly after
a broad process of sarcodite protruded on
the opposite side. Subsequently the sucker
rays and animal became motionless &
the animal appeared slowly to undergo disso-
lution, gradually expanding to 24 div. The
clear and colorless border spreading so as
to obliterate or conceal the rays. The nucleus
became more obvious, was circular, palest
tint than the orange colored exterior &
measured 7 div. diameter. The structure
of the body with colored & uncolored portion
appeared to be a pale finely granular hemis
with large granules colored & uncolored and
clear globules up to 1 div. diam., resembling
the minute suckers with globules of the rays.
The colorless periphery of the body was
continuous with the protruded colorless

sarcodle and appeared to be of the same
constitution.

Later the changes above indicated appeared not
to be the result of dissolution, as the body was
observed again to contract to 22 diam. and become
more active. It again protruded rays, and changed
from the globular form by presenting several
angular projections of the periphery, and
again several papilla like processes of
sarcodle. The latter again withdrawn,
and from the former angular prominences
small fasciculi ^{agg} of smaller rays for a
short time protruded, then were again
withdrawn, the body became more even
and from it were projected a number
of ordinary rays. Having become involved
in the dirt or shaking for some time the
cover glass, the animal became more
globular 20 diam, with ordinary short rays
quite numerous. Shortly after retraction
most of the latter, became very irregular
in form from angular extensions ^{Wrigg} of
the cilialess surface on one side

fine grains and some sareole along their length
as often observed on the rays of *Aetomophrys*.
Then withdrew the granular or sucker rays, became
oval 21 by 18, and glided along protruding all
round ordinary rays with no sucker rays.
These ordin. rays were longer, stouter and
fewer than those originally observed, & were
more numerous on the side in direction
of gliding motion of the animal. Hence
we assumed nearly the original circular
form 18 diam with both kinds of rays, but
fewer, especially the sucker rays, which
projected from one fifth the periphery on the
side opposite the gliding motion of the
animal. As the animal moved on it
would from time to time slightly change its
shape, become flattened on one side, become
uniform, while one or less auxiliary sc. The
ordin. rays up to 9 elongate caudal, would
sway from side to side, while the sucker rays
would be projected & as rapidly withdrawn.
In course of observation in several instances it
appeared as if the nucleus underwent some
change of form, from globular to oval and
even irregular. It finally was completely

obscured from view, and the interior orange colored entrance
appeared lighter and darker.

An apparent cast skin of the *Echinocystis*-like *Kellogg*
with blunt spines: Spines or rays 7 long, apparently blunt
in appearance of fuscation. The skin at the broken
edge appeared to be made up of a double continued
interrupted line, apparently composed of compressed
minute laminular plates? perhaps the bases of the
spines. Apparently a few of these laminular disks were
seen isolated, but it was not positively determined that
they pertained to the spines.

Difflugia 16 long 13 broad, with a neck 1 long and 5 wide.
Mouth irregularly circular, following outline of the stones.
Associated with multitudes of *Diatomas*, mostly a
signed varicula $\int 40 \times 5$, from a pool connected
with Smith's Fork, in which grew *Potomia*.

August 11th. 1877 China Lake, Uintas, W. T.

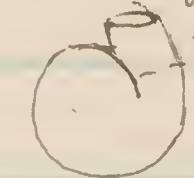
Zirrena acinus.

Euglypha alveolata, spineless variety

do do 26, 16, 7, with short spines, four or five
to fundus only 2 long. Four intermediate serrate points
to mouth

Euglypha lewissae? colorless test, empty. 12, 9, 3.

Difflugia pyriformis: in considerable variety of size and shape, and in proportionate size of stones. The commonest form. One 50-40-15 crave stones.

Dif. spiralis - of stones, not common. 32 long, 29 broad, 22 thick, neck 4 long mouth 8  partition 10 long. Also found in Asphalt pond.

Dif. marsupiformis. Several varieties.

See drawing of Aug. 12. Body of test covered with dirt particles and stones; the mouth part of diatoms &c.

Difflugia -  68-60; neck 40 wide, 9 long from level of mouth, width across rim 48 depth of reflection of do 4. Large stones in fundus of which several found conspicuous projections, but no true processes.

Difflugia acuminata. The point generally an abrupt finger-like process, obtuse nearly thick in long, and in many specimens unsymmetrical or pointing from side: → 

The stones often crisper at intermediate part of test than at fundus.

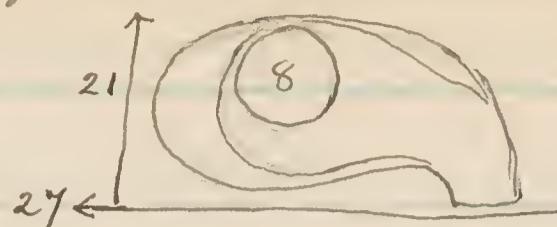
Echinophrys. Considerable variety, with spines, and without spines.

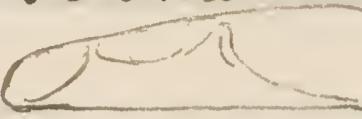
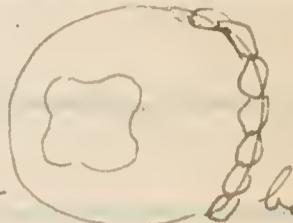
Arcella discidea 25 broad mouth 8, height of test 8.

Arcella vulgaris 23 wide 13 high mouth 5. Capped variety, three rows caps 5 wide. 

Cyphoderion - not anfregnat, with obtuse prudres

30-17-5, nucleus 8.



Echinopyxis 50 larva 17 high mouth 20
loaded with  crane stems at  back
border. No spines mouth with four sinues edged
with lurn. Test raw sienna.

Arcella. of extreme delicacy - See drawing Aug. 11.

Another indiv. 15, mouth $2\frac{1}{2}$ saucer shaped over 11.
apparent nucleus 2 enclosing a darker nucleus $\frac{1}{2}$
several cent. res. to 2.

Echinomyctis vividis. 20 diam. Furcate rays
numerous, apparently of one kind only, i.e. the
longer ones, measuring about 12. In
moving sometimes a large fasciculus  of the
rays converged on one side. Ordinary rays few
up to 18 long. Colulus periphery $1\frac{1}{2}$ thick. Green grains ranging
from $\frac{3}{4}$ to $1\frac{1}{2}$ average about 1. A thin stratum of fine granules
inviting the bottom of the rays.

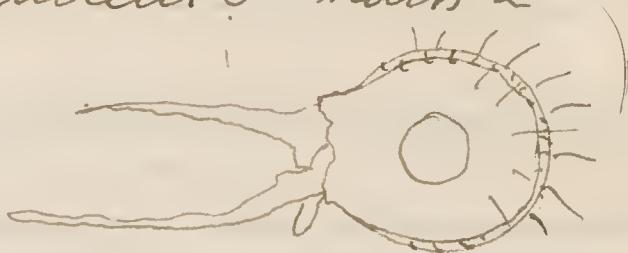
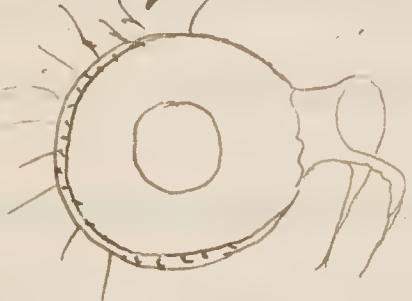
Nebula! Empty test; compressed angularly pyriform
mouth elliptical. 30-17 by 12 + mouth 7 by 5.

Test with rounded polyhedral meshes of variable
size mingled with a few linear forms.



Anolecta gonalis. ordinary form.

Amphizmella vestita Test faint brownish, with short stiff hairs. Body 10, nucleus 3 hairs 2 pseudopods up to 12



New genus et sp. Pseudopods filamentous as in Eulypha and Cyphularia. Test in form like that of Cyphularia but with two appendages one on each side of funus. Structure of test chitinous, yellowish, with adherent sand particles, but with no evidence of the structure in Cyphularia or Arcella, but appears to be like that of Echinopyxis. See drawing.

August 13th. China Lake water limas
Eulypha globosa. Living specimen. Test globose. with neck 9 long, body 7 broad neck $1\frac{1}{2}$ long mouth 3 wide.

Eulypha alcedata. Several specimens seen with 5 and 6 divergent spines from funus.

Nebula annata. A very characteristic test observed. See drawing of date. Also several others less well marked.

Arcella, discoid form. 30 wide 18 high, with mouth 14 wide or nearly half width of test. See drawing of date.

Pelomyxa - Oval 80 by 40 See drawing of date.
Translucent, colorless, replete with a granular
ectosarc mingled with food or dirt consisting
of granules, quartz particles (up to 7 by 5 in size),
diatoms, fragments of diatoms and of hyphum
leaves. Ectosarc colored more or less with
brownish and green from the food like particles.
Motions of animal. Usually a slow regular
forward rolling motion, the ectosarc following
closely on the advance of the ectosarc.
Occasionally from the fore part, in front or
on either side there would be a rather
abrupt protrusion or advance of the ectosarc
followed by advance of the ectosarc as if on
the point of bursting. Generally in the
process of the animal, from behind there
could be observed protruding the edge of an
apparent circular disk, striate and minutely
vibrissae at the edge. Projecting from the edge
there could also be detected from time to time
cilia-like filaments, not vibratile, as rep-
resented in the drawing. Frequently the vibrissae
disk was altogether absent. No vacuoles
were visible, nor at any time did a
contractile vacuole come into view. There

was also at no time any motion observable such as is often seen in an Anemba from the collapse of a cont. vesicle. At times a strong light transmitted would show a clearer central spot as if dependent on the existence of a nucleus, but no other traces of this could be detected in the motions of the animal.

Would slowly roll onward without change from the oval form, or would assume form as represented in the drawing. In the former condition would exhibit no trace of the villous disk. Sometimes instead of the latter the back end would appear to be gradually resolved into a fine villous fringe. When disturbed and made to contract to nearly a globular form it measured about 55 diam. Shortly after it assumed an oval form 60 by 40 with a posterior circular villous disk about 10 diameter.

Difflugia with trilobed mouth, of stones.
Nebela minuta with unusually well defined neck. Test flask shaped. Aneolae indistinct. See drawing of Aug. 14th.

August 14th. *Altinoplus Eichhorni*. Frequent in China Lake. A fine vigorous individual. See drawing. Globular 70 div. diam. Outer stratum of vesicles 10 thick. Rays numerous uniformly distributed - to 45 long beyond the surface of the body. Outer vesicles 6 & 7 thick, by 10 deep. Inner vesicles 3 to 5 diam. A large cent. vesicle 17 by 13 but enlarged to 20 by 16 before collapsing. Animal contained six large food vacuoles in interior 15 or more in diameter, one measuring 20. These contained large white granular food balls; one a vorticella not yet dead; another from the jaws indicated a rotifer; the others undetermined. A similar large food vacuole occupied the outer stratum besides a smaller one, both of which were subsequently drawn into the interior. The animal also contained three large diatoms, a *Gymnema*, and other matter not determined. See drawing of late.

August 16th. Water from a small lake at foot of Bridger Butte about 8 m. from Ft Bridger obtained the previous day. Alive with Cyclops, Daphnia, Cypris, & Coleps. Also contained abundance of *Euglenia* some species, besides *Spirostomum*. Many desmid

and diatoms. Of Rhizopods there was a great abundance of an Amoeba, and a vase-like Diffugia.

Amoeba often spherical, limaciform, palmate, stellate, with blunt digitiform pseudopods, few or many, often with a posterior villous process. Usually with one contractile vesicle. Nucleus absent or indeterminate from oil-like globules or food vacuoles. Body ~~can~~ sometimes with a fine granular entisare with some darkly defined ellipsoidal, crystalline granules. A nutty one or less replete with food, containing of diatoms, denoted δ . Most of them contained small diatoms.  One of these without food, rosette-like measured 20 by 20. Another limaciform  bent in itself with several diatoms measured 33 by 12. Another palmate measured 30 by 15. One had a large diatom when first seen at right angles, see figure of date. A large one meas 30 by 20. with a pseudopod 15 by 3. Contract. ves. from 3 to 5. The vase-like Diffugian, very abundant & almost the exclusive one. = Obovoid, with the mouth at the broad end, and usually

surrounded by a straight rim 1 or $1\frac{1}{2}$ long, occasionally evated or short funnel like and 2 long. Mouth round. Test not infrequently more or less unsymmetrical, or oblique, or more prominent on one side than the other. Small ones, not frequent without rim to the mouth resembled *D. vulgaris* - one of which was oval 20 long 17 broad with the circular mouth 7. A large rimless one was 42 long 32 broad with the mouth 12. Another with short straight rim to mouth was 50 long, 32 broad with the neck 1 long & mouth 14. Another we figure: was 50 - 28, neck evated 2 long 17 wide at edge. Test constructed of median sized striae & exterior comparatively even.

China Lake, Aug. 16.

Actin. Eichhornii. An individual, actinic containing two small diatoms, &c. Diam 30 rays many, uniformly distributed th 30 long. Outer stratum of vesicles 7 thick. Rays punctate to the inner vesicular mass which measured about 15 diam (No 7).

Euglypha alveolata with eight short spines to fundus not more than 2 dia. long. a common form. 30-18-7. Three intermediate pts. to mouth. Nucleus clear spot 7.

Aug. 21 *Cyphodocia*. A frequent form in China Lake. All from this locality seen had the fundus obtuse, while nearly all of those from Mt. Bridge ponds & pools had the fundus more or less abruptly narrowed into a digit-like point. In a specimen from China Lake 30-13-4 the nucleus was unusually distinct & measured 7.

Diffugia. Bridge Battle pond (Lamb's Pond) contained multitudes of an ovoid vase-like *Diffugia*  with a short neck or rim, usually straight, rarely excised, but they were all empty. 52-28-neck 2 by 14. Body ovoid the narrowest pole forming the summit.

Diffugia pyriformis from China Lake 115-85-45 of coarse stones. living specimen: — 

Diffugia - pot-form, with last 70-60, at rim 42 at neck 35. Edge of rim thin, of minute stones. Surface of body, uneven; of large stones.

Euglypha compressa. China Lake. Hirsute variety. 18-10-4 by 18-5-3. Hirsute all over at 5 along the mouth. Hair about 5 long.

Aug. 23 China Lake water.

Observed two additional specimens of the new genus, one living, the other an empty test, of which see drawing of date. Test membranous clay colored, granular, with adherent granular grains smooth with a delicate, colorless, membranous lip reflected outwardly, and with an undulant edge. Individual 35 long 28 wide between points, 18 thick, smooth & with the reflected lip 10.

In same water *Cyphoderia* fragment. A three lobed smooth *Difflugia* was nearly globular 32 diameter with  smooth 10 between points of base and summit lines, the sinuses or lobes 5 deep & 5 wide. Test of stones, membrane even.

Aecidium vulgaris, cupped variety - See drawing. Difflugia of pot form with beautifully delicate reflected lip of fine sand particles; the body covered of large and moderate sized granular grains. Another with eroded lip but not reflected and somewhat pointed summit. See drawings of date. Outlines of one half.

The three common Diffugias of Lehina Lake
are. *D. pyriformis*, *D. acuminata* and
D.-pot-like 

D. spiralis and *D. marsupiformis* less frequent.
Actinoplys Eichhornii and *Cyphoderia* also
common.

Euglypha alveolata with very short spines
moderately frequent.

Arcella vulgaris, ciliated variety most frequent
of this genus.

Echinopyxis, with & without spines & in
immense variety, moderately frequent.

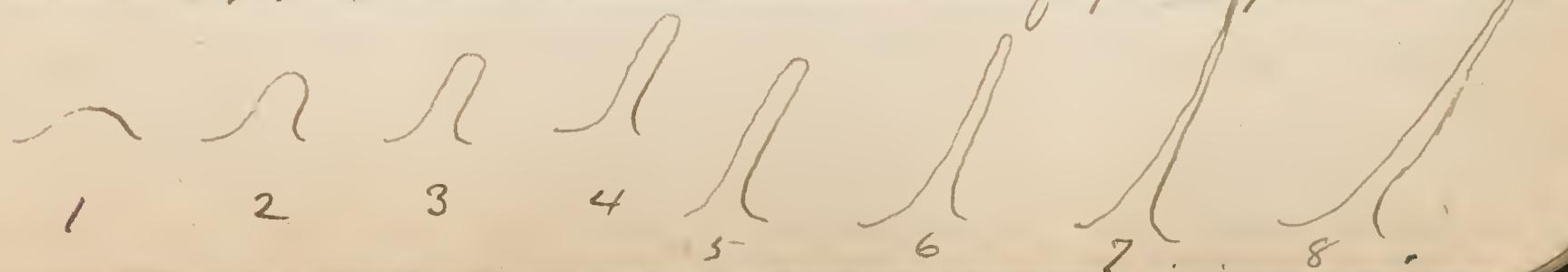
Philadelphia. September 20. 1877.

Dinamoeba. From Atco, N.J. Sep. 21.

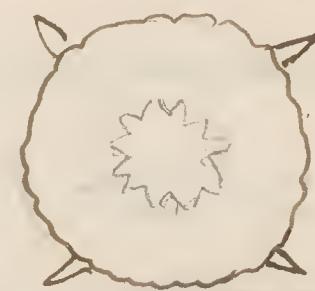
Early in the morning observed a specimen
See drawing of date I - pyriform, apparently with
a half cell of Clisterium in body transversely
and projecting on left, with a large vacuole
20 diam, and other smaller ones contiguous.
Length 45 width of body 35. Length Clisterium half
cell 52 by 5 at narrow end & 11 at broken end. Pseudo
pods only from head of pear; no villous processes
behind. Spicules minute in quantity. Thin
ectoane extended over the projecting part of
the Clisterium & this was also spiculate.
View second - an hour later II. Length 55 width 35
Clisterium longitudinal, showed to be doubled
the fine point shorter, colunns and shrivelled.
Large vacuole still present. Later III outline
fine Clisterium oblique. A villous tail to right.
Food balls comp. few confined in this and previous
views in advance of the large vacuole. Two
small vacuoles in villous tail - 60 by 25.
Later IV Body bursint shaped, villous tail gone
55 long - 28 wide in front 25 behind. Pseudopods 10 to
30 in length. Later V. Discharge of fine granules

and ligated to left of tail end, & projection of
a pine shaped process 10 by 6 which gradually
became a pseudopod 20 long. The large vacuole
had disappeared & its place occupied by several
others of which largest measured 10 div. as seen
in VI. Latter part of afternoon as in VII 60
long 30 wide at first part & truncate tail end.
even or without villous processes 25 long &
15 broad. A vacuole at end with green
excrement which was shortly after discharged.
Several similar masses descended
& were discharged in same manner. Tail
end formed of clear estuarine. Contents of
animal through discharge of matter had
become more transparent & thus seen to
consist of molecular granules from a few
μm to $\frac{1}{2}$ & to 1 $\frac{1}{2}$ the larger like fine
sil or aleuronite globules; also many vacuoles
everywhere apparent from 1 to 4 or more in
size. Pseudopods to 25 & 30 long. Spicules
apparently everywhere absent or had
disappeared entirely. Several of the back
pseudopods with small rounded villi. In
the evening found that the animal had
discharged the Clisterium which lay.

nearby: Animal as in VIII 55 by 25, with eight pseudopods 15 to 25 in front. Food balls all at anterior third of body. The Clitellum half cell 52-5-11 - ~~pale~~ raw sienna color darker at the end. Endochrome giving a shindled patterned band; from open end projects the thin shindled colorless other half about 30 long. Was this a Clitellum which had been swallowed just after the production of a new half cell? which was then delicate & colorless. Appearance of animal next morning as in IX. Viewed and drawn under Wates $\frac{1}{10}$ (All the other viewed as usual with the No 7 S.N.) Under the $\frac{1}{10}$ measured 70 long indep. of the tail processes etc. Germ discharge of food, normally transcurrent. Contents of vacuoles ranging from 2 to 10, and a nucleolar basis of granules up to 1 in width, about 1. Food balls few in front. The vacuoles containing maximum appeared to under very slow contraction w very slow enlargement. The larger appeared shrunk & disapp'd while small ones started into existence & gradually enlarged & in turn again contracted & disapp'd. Formation of pseudopods:



Difflugia corona Lotus Pond, Woodstock, N.J. Sep. 22.
Comparatively even and globular 25 diam. Mouth
13 with eleven points and sinuses. Points acute &
broad, sinuses rounded & wide and deep. The 4
spines of the fundus, indep. of central one, could
be seen nearly equidistant
in the view from the mouth
measuring 3 and 4. Thus.

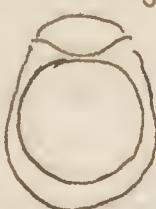


Acantho
An Echinocystis found with above. With valves $\frac{1}{10}$
green globules $1\frac{1}{2}$ to 2; forked rays 20, divergence of
forks about 1, dinters at base about $1\frac{1}{2}$. Body
fine green 35 diameter.

Sep. 24. Examination of Echinocystis from Sanford Pond
Maine. Test appears to have the same constitution
as in Acantha, but is generally more or less & sometimes
completely obscured from view by adherent sandgrains
and diatoms, and in addition by the osmicide & its abundant
food contents of diatoms &c. Constitution especially distinct
in the darker colored specimens, usually well marked
in the body but not discernable in the spines. These
latter generally have a colubriform point that
looks like putty from the open end of minute points
of osmicide.

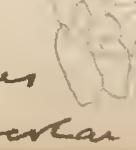
Echinopyxis, of same form and constitution & color as the former, but without spines. Approaches closely in appearance the discoid form of *Arcella*. From this differs in ascending process of mouth and adhesion of numerous fine particles of sand. Lotus Pond - Woodstock N. J.

Nebela Sphagni - Hammonton N. J. Sep. 27, 1877

Test 34 long 28 broad. Saccula forming a circular ball 23 diam., green globules within chiefly 2 diam. Opercle 7 thick.  breadth 16 of mouth do.

Another with it 26 long 19 wide, saccula ball oval 21 long 17 wide green globules chiefly 2 diam. Opercle 3 $\frac{1}{2}$ thick mouth 11 wide. The saccula ball & opercle nearly occupy the interior 

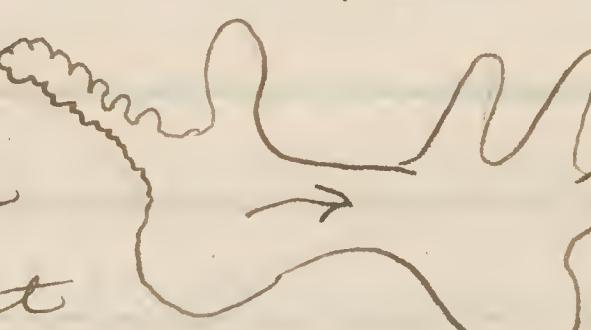
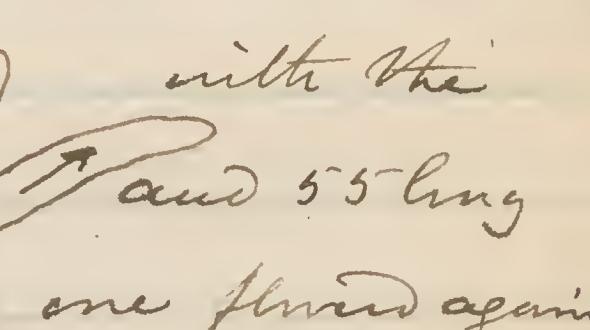
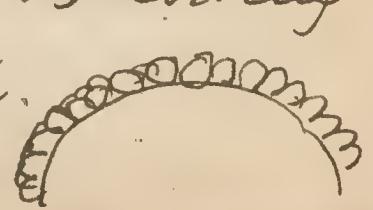
An empty test nearly long & in company with preceding was 37 long 28 wide with mouth 17 wide. Avesule of test about 2 diam. - Meas No 75. H.

Nebela allied to former, braded with stones at funnels and animal colorless - probably an undescribed species. Length of test including large  stones at funnels 40 - without 34; breadth 20  mouth 15, its projection 3. Breadth of mass of stones  17 depth of larger ones 12. Saccula mass 20 by 15; avesula of test 1 + 2.

A second of same kind with large stony f.
Gaster 42 long, 22 wide, mouth 14 wide. Then
found in water of Keamington Pond. The
test as well as the sacrode cibos, except
from the food which consists of diatoms, desmids
sc. meas. No 7 S.H. Sep. 27. 1877

A third represented in drawing of Sep. 28, as
viewed & measured under Wiles 10.

Mouth elliptical, with acute commissures.

Anavelia princeps. Woodstown Lotus pond, N.J.
A large specimen, when first seen covered a
space of 150 by 150 and appeared to be in state
of division. Thus:  with the
isthmus 40 thick
(with No 7.S.H) but  one fused again
into the other. In this, often observed as the
contents of a large pseudopod flooded innately
it contracted and became shrivelled in
appearance with grape like appearance
of the surface. After remaining ten days
in live box, appeared quiet, forming an oval
mass with defined line 115 by 95 closely
covered with small globular pseudopods looking
like a layer of globules about 4 thick.
Then measured 3 & 4 in diameter and 

contained granules, together with an occasional crystal. (With No 4 measured 20 by 18) former measurements are with No 7.

Acanthella princeps
with No 4.

35 long

(Front 40 wide with No 7, main branch 15 wide)
lesser ones 15 thick. Vacuoles & food balls 5 to 7.)

Another measured with No 4

was 30 long. 7 wide where thickest
with main branch 3 thick and smaller ones 2 thick.
Another measured 40 long with an expanse of 15,
gutters end 3 wide.

In a large specimen extending into two branches
one of them was 200 div. long the other 150 with
No 7 15 to 20 thick.

With 10% Nalco a contractile vesicle in
tail end measured 20. The villous tail end
was 50 long 40 wide at base. The body in
admission was 50 wide. The villi measured
5 to 10 long. The octahedral crystals were 3
long by 1½ wide. Oil like granules measured
up to 1 in diameter

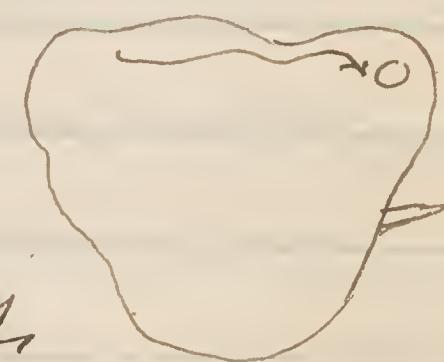
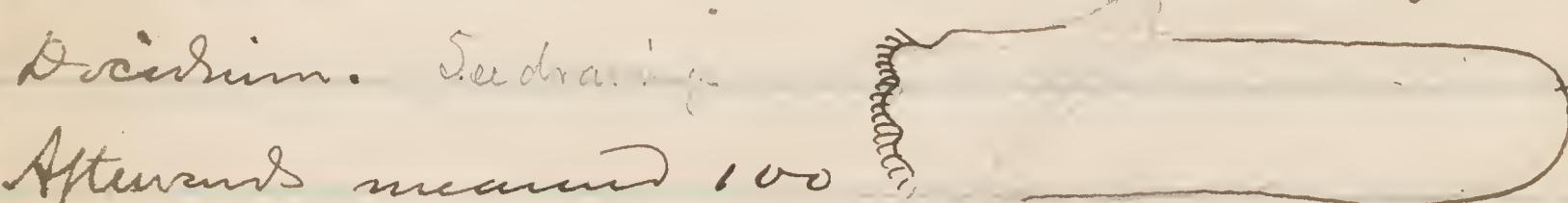
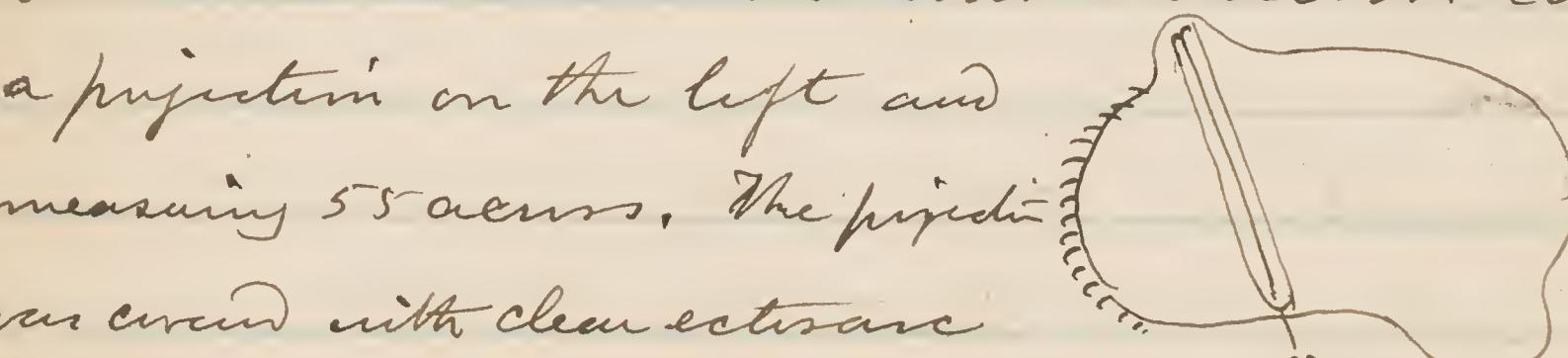
Pelomyxa. From Hammonston pond, N.J.

Sep. 28, 1877. A large specimen oval, thin
reniform 75 by 50 by reflected light appear
cream colored with brownish and greenish spots
and minute transparent villi punctately.

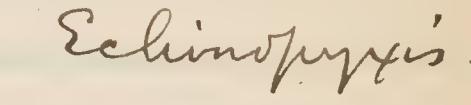
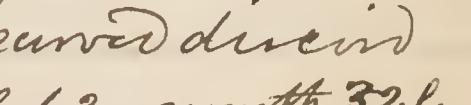
Contained a discidium doubled across causing
a projection on the left and
measuring 55 across. The projection
was covered with clear ectosarc
with granular matter in axis about end of the
Discidium. See drawing.

Afterwards measured 100
long by 37 in front & 40 behind. The short process
with villi contained small vacuoles & granules.
With No 7 S.H. With $\frac{1}{10}$ Malpighi the villi appear
linear & from 2 to 3 div. long.

In another view in which
no villi were visible, appeared
somewhat cordiform 60 by 40. As
ectosarc bulged to right or other position
the entosarc flattened laterally, mainly of
granules but occasionally with a visible
vacuole. Once in a while a small conical
process would appear. Next day appeared
like a spherical globule of transparent colorless ectosarc
50 diam. with a fine granular mass occupying more than
 $\frac{3}{5}$ ths. containing a clearer spot apparently a nucleus.



Finn Spence pond. Maine:

Actinophrys Eichhornii 35 diam. The central mass
20 Rays to 25 long. The "red Steineta". *Difflugia* found
Difflugia cincta. *D. pyriformis*. *D. acuminata*
Arcella vulgaris of several forms  
 *Euglypha alveolata*. *Echinopryxis*-
One test with eight spines. Curved discoid
Arcella with large aperture - oval 66 by 62, width 32 by
28. Height of test about 20. Also polyhedral form .

Difflugia olla. Abundant in Hammond
pond. A large specimen 85 long exclusive
of spines 75 broad. Neck expanding outwardly
with a narrow reflected rim of minute stones
58 wide, 50 wide above where begins to
expand in body. Neck composed of the
largest stones, most of them the depth
of the neck. Body of scattered larger &
intermediate smaller stones, none so large
as those of the neck. Seven short blunt
spines to 1 mm. each ending in a
single stone wider than the spine just below
it. Spines 8 long 5 thick at middle: - one
central, the others forming an irregular circle
(Meas. No 75. H)

Difflugia Olla - 88 by 80. Neck & lip 10 long;
reflected lip 58 wide, neck 45 wide. Six
blunt spines to fundus, ending each in a
single broader spine. Spines 10 by 5.
Animal cylind., pseudopods to half a
dozen or more. Seven seen at once
3 thick. Atco, N. J. Sep. 28, 1877.

Quadrula symmetrica with $\frac{1}{10}$ males 27-15-5.
Large plates near fundus 4; near mouth 2.
Sphagnum Hammonitum. Sep. 28, 1877
Euglypha brunnnea, abundant Hammonitum

Pelomyxa of Atco N. J. Sep. 29. An individual
observed 45 by 40 Oval, quiescent, with no
appearance of cili, perfectly even at the
border. Pelomyxa is readily seen with
the naked eye, looking as a white granule
among the other materials with which it is
found.

Anavelia princeps. Nelson Pond, Woodstock
N.J. Sep. 30. A large active individual in
irregular palmate form, occupied space of
130 div in length and 90 in breadth. (See drawing of
date) with pedopds 10 to 15 thick. Cont. vesicle 9
or 8 to 10. No discernable nucleus! Many food
balls in axis, usually 3 to 6, some to 10 or even
15; globular, oval, irregular, straw colored,
shining or oil-like, refracting granular, dark
outlined. These mingled with many pale
colorless vacuoles 3 & 4 div. Food not in vacuoles
distinct from the granular masses. Observed a
Brachionus? alive within the prot. end, in
advance of Cont. ves. This latter was crowded
into an oval ball resembling the food balls
above described. In movement, the body generally
and also the larger pedopds present a longitudinally
ridged, folded or fluted appearance. The axial
contents of axis are more or less in the interior of
a thick walled cavity, of which walls composed
of fine granular matter with scattered crystals,
while moving parts of granules, vacuoles, crystals
and food balls. Cont. vesicle generally posterior
but may also move with other matters. In
movement, all axial contents do not move

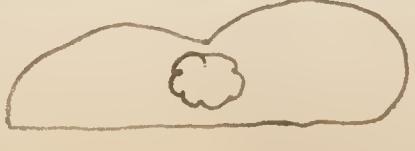
together, some including food balls appear to adhere to inner surface of extensible tube but gradually become detached & one after another. As the posterior part of body becomes exhausted of its contents (axial contents) it contracts, shrivels, assumes or continues its simberry-like appearance as this contracts and disappears the front of body in advance assumes or continues the same in appearance. At this instant passes an opposite direction and the tail end expands, radiates & becomes the fore end, while part which was passing in advance assumes the villous appearance. At this in extreme contraction, after the irradiation of a great multitude of smaller pseudopods, the ~~radiating~~ body especially at its back part has assumed a tessellated appearance from the mutual pressure of the short pseudopods on one another. Want of irritability often exhibited in no contractile movements observed in consequence of shorter, or contact with an insensibile in active matter.

Arcella — ? Atco. N.J. Oct. 3. Several observed. One with test 26 mmth 8 No 754. had two nuclei 2 diam or with halo over 3. had also eight c.v. at once measuring from 2 to 5 mm at once reached 5 div.

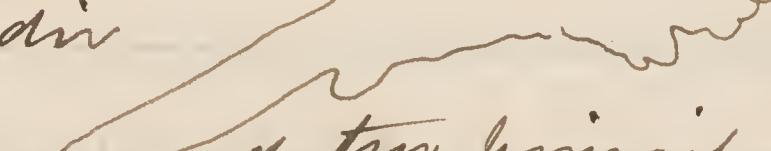
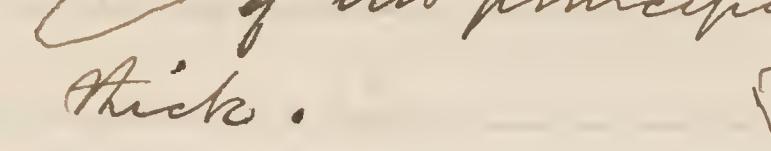
Another had six gas? bubbles thus: These gradually disappeared without any apparent displacement.

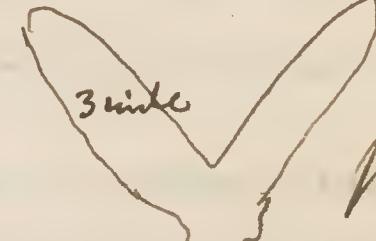
In another observed three nuclei and from 9 to a dozen c.v. at once from 1 to 3 diam. usually about 2.

Heliogzon from Atco, N.J. Oct. 3, 1877
Same previously seen in water from Broad Mt.
Sep. 12, 1876 Measurements with 10% Nales.

Animal presented a pinkish hue, was biscuit shaped, or elongated oval & narrowed in middle 30 by 17  composed of an aggregation of minute globules 2 div. pretty uniform with a bright red globule (carmine color) within about $\frac{1}{2}$ div. Rays everywhere from 4 to 10 or more. Moved slowly gliding over field slowly changing the form. As it moved an apparent break occurred near centre  through a thin layer of the globules were seen & it made the

animal appear as if hollow & having the globules
on the surface of a cluster central sarcic
matter. Some of the red points within the
constituent globules appeared brighter red
than the others. Ray exceedingly delicate
not radiating regularly, but in any direction
from the surface. Some apparently branched

Aurelia princeps. Woodstown, N.J. An active
individual  occupied a
length of 160 div  with No 7
The longest  of ten principal arms was
100 by 10 in thick.

Afterwards viewed with No 4  presented
a Y-like appearance. The arms were 40 long
and divided 60. These divided more and
more  until occupied
nearly same line & measured 80 long by
 $2\frac{1}{2}$ + 2 wide. Supposed we going to
separate, but the one div. afterwards flowed
into other & creature assumed the ordinary
palmate form

Dinanveher. Ated water Oct. 6, 1877
viewed with 10x Wiles. As first seen oval 80 by 50
white, with spots produced by cells of Didg. Sordellia.
Pseudopods as usual, but instead of the usual
hacteria-like cils had apparently attached minute
darkly defined globules or granules looking like cil under.
undetermined whether on free surface or contain within minute
hairs of ectosarc. See drawing of late. Pseudopods few.
Animal sluggish. Border of body exhibited very minute
spicules & granules as on the pseudopods.

Clathronaria on under side of *Nymphaea* leaves

Hammonton Pond. N. J. Oct. 6, 1877 (N^o 10 Wales) 4

No. 1. Somewhat pyriform 21 by 19 brownish - lattice holes about 2
 . lines between less than 1, rays exceedingly delicate to 15.
 . Test filled contents indeterminate. rays involved
 in a faint granular stratum at least about 2 thick

No 2 20th 18 same form and appearance as No 1 except rays not involved in granular layer at cost.

N^o 3. Spherical, 16 diam. colorless, lattice very pale, with
an interior mass 60 with globules from 1 to 2 & greater.
Rays extend from this central mass, & 12 outside of
the lattice units of the test, the lattice holes same size as in others.

No 4. Apparently without test 12 diam  sunberry like compound
of granules & globules the latter 1 to 2; the larger globules
look granular. Rays to 10. Apparently an internal central
nucleus about 4 but too indistinct to determine exactly.
The stems are double contoured on each side & measure
2 thick. Delicate circle, outline of test afterward divided
to No 4 giving it a diameter of 15.

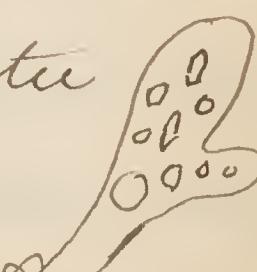
Arcella young. Oct. 5, 1877 Observed many minute Arcella in water from Atco. Mottly dark raw sienna or light burnt sienna color. Usually from 7 to 9 div. lined with 10 walls. Generally the mouth not visible apparently obscured by the interior sarcide. Generally adherent to the cover glass, and could not be detached by shaking. The aerulated structure of the test quite distinct about $\frac{1}{2}$. Contractile vesicles usually two or three. Usually also a pale nucleus surrounded by clear halo in which see some decided color of the test; as is also the case through the c. v. The latter about 2 div. Nucleus indep. of halo $1\frac{1}{4}$ to $1\frac{1}{2}$ Sarcide granular, with large globules cil-like 1 minute. granular balls, probably food.

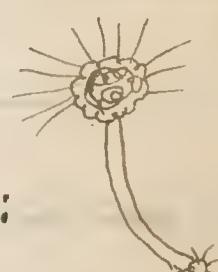
Examples. One light burnt sienna, distinctly aerulated 8 diam. Cont. ves. to 3 in number 1 to 2 diam. Nucleus $1\frac{1}{4}$ Sarcide mass 5 div. A second paler 7 diam sarcide mass $4\frac{1}{2}$, one C. V. 2. Nucleus not detected A 3d size of first but pale raw sienna, with two C. V. on one side & pale nucleus with halo another A fourth like the first. A fifth do but 9 div & darker. A sixth, same size, 9 diam. Cont. ves. on left dis- appear & reappear continually, while what was supposed to be another one portion of nucleus remains permanently, & therefore supposed to be a vesicle enclosing latter.

Dranther, apparently the mouth faintly seen as a circle
of 2 div. Dranther 8 div. See fig. with 3 c.v and a
nucleus.

Difflugia olla - Atco. N.J. Oct. 6, 1887 A large
indiv. 90 by 80 with tubercles of funicles 10 long and
wide at base ending in one or two large stars
as wide as length. Thus  Pseudopods 3 & 4 thick

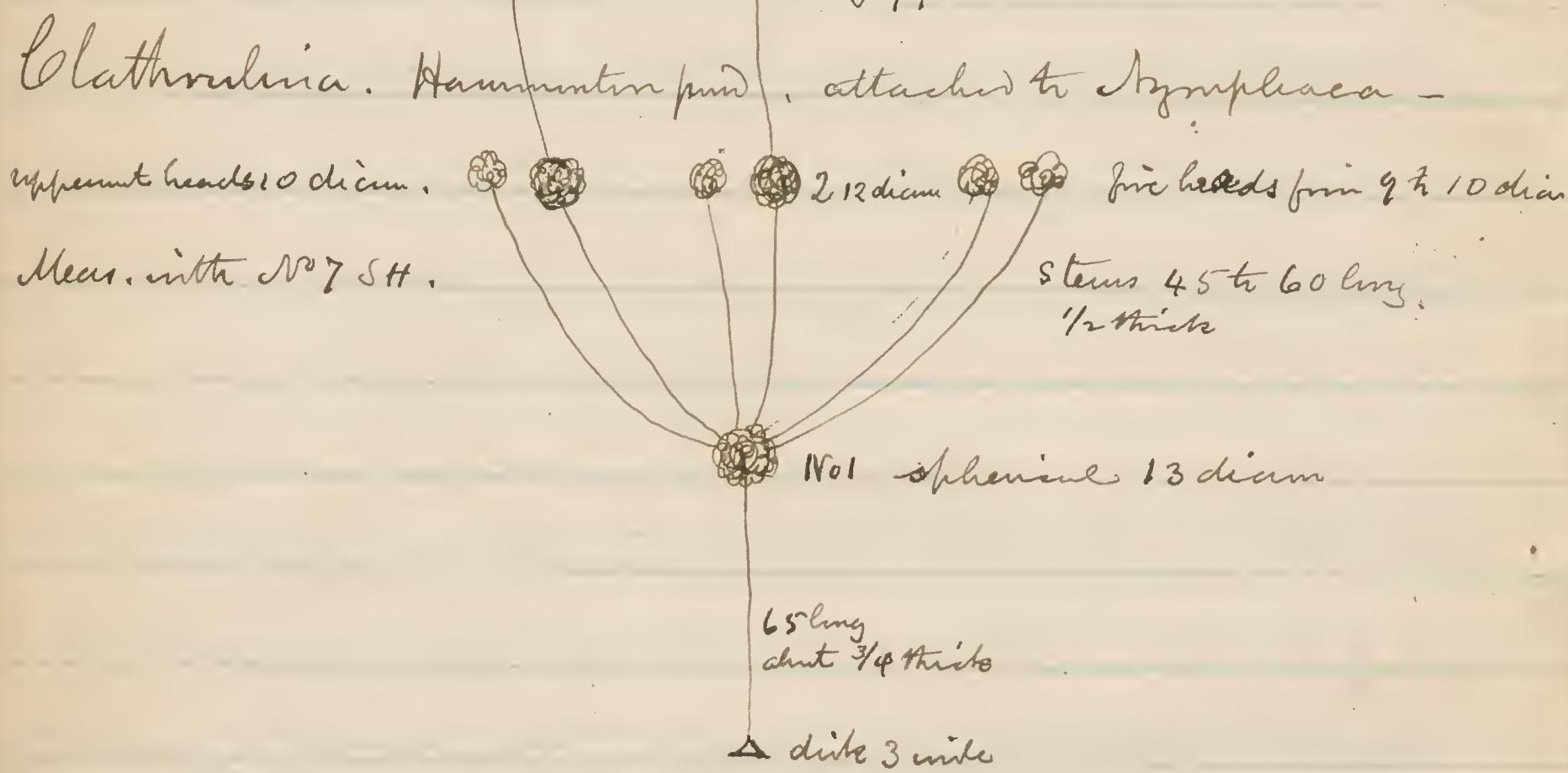
Difflugia with feebly quadrilobate mouth thus: (8)
Test of stems, worn  35 by 25.

Anuclea princeps young. Atco water
20 by 6 (No 7) crystals 1 to 2 long
Contents granular, will like do crystals, minute  vacuoles
a few to 3 diam. No nucleus detected.

Clathrulina. Oct. 7. Next morning the head No 4
was empty. Near by was a pedunculate 
Actinophrys like body, without discernable test:
Head 13 diam. rays to 15, delicate, granular. Head granular
with globules about $\frac{1}{4}$ diam. Stem $35 \frac{1}{2}$ by $2^{\frac{1}{2}}$ (No 10 Wales) End
of stem ciliated nine radiates lies upon the glass.
Whole colorless. Body apparent with a central faint
yellowish nucleus 2 in diameter. Head with irregular
mottling like outline with vesicles on surface up to 2 diameter
A few vesicles attached to rays - apparently unicellular food.

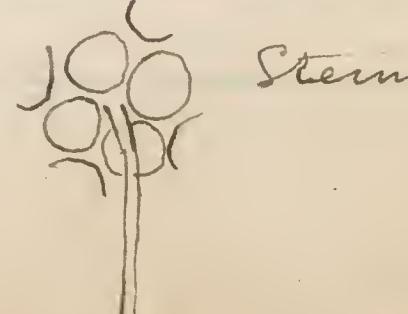
Head would slowly change its form, becoming more regularly spherical or the reverse. Testicles would appear at shrub size in the surface but remain a long time undivided before they would diapher. Could detect no appendages and greatest development to collapse of C.V. and Actinoplys. Testicles on surface

50 long & $\frac{1}{4}$ dia.



In some specimens of Clathroulina the orifices of the test appear decidedly circular and oval in others more of a polyhedral character. In some also the main stem only 1 in thickness with 10 holes; in others twice the thickness.

A full grown empty test measured with 10 holes 17 diam, with circular holes $2\frac{1}{2}$ intervals $\frac{1}{2}$ or less, stem 1 thick 110 long and disk 3 wide. Stem attached in interval of four holes: →

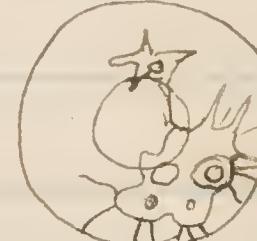


Heliocozon — ? An Actinoplax-like animal
colorless, spherical, with exterior layer of disks and
delicate rigid rays, not furcate, but starting from minute
disks. Interior colorless fine granular contents with pale
globules. Glides slowly like Actinoplax, sometimes fasciculi
of the rays sway toward one side. Slight change of form
from the sphere, from elevation of the center incertum.
Meas. with $\frac{1}{10}$ W. Body 12 diam., rigid rays 10 long. Soft rays
few, culm invisible to 15 or even 20 long. While observing
the animal, saw coming into contact a minute sunlike
oval flagellate body 5 long. Suddenly lost its power,
& assumed a spherical form. (O) This was uniformly pale
& finely granular with a pinkish nucleus. This body
was drawn several times to the heliozon and as often
pushed away beyond ends of rigid rays but retained by
several of the soft rays. As was pushed off it was shown
to have ~~adherent~~ two of the detached rays of the heliozon.
In moments of drawing in and pushing out the heliozon
thus became void from projection opposite the
apparent food ball but often assumed its rigid
form. Visiting the Heliozon swallow its food; the
hole was watched for several hours. After time a
globule appeared on one side & this elongated to 5 by two thus:
 showing it to be a germinating zoospore. This continued
to grow and finally was abandoned by
the heliozon.

Anavelia radixa Astro water. (Lent 15) occupying
any space of 40 by 20 in stellate form.

Contents: C.V. 4; granules with larger like oil particles and
few minute vacuoles. No nucleus detected. No
crystals

A. radixa do. (1/10 Wales.) Body rounded 4. with
eight pointed armstheas:  8 to 10 long. $1\frac{1}{2}$ to 2 wide
at base; C.V. 2. Pale round spot probably a nucleus $1\frac{1}{2}$.

Arcella. do (Lent 15) 21 broad, smooth 7, bright iron
sienna, areolae of test distinct $\frac{1}{2}$
divided into two amoeboid masses:  Sarcodite
large mass occupying spaces of 10 by 10 in right, smaller one
mass of 5 with its projections.

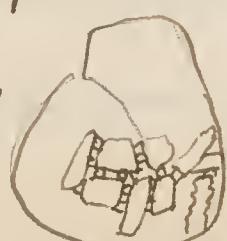


Diffusing from under surface of *Symploea* leaves
Hammonden. N.J. 18, 12, 7 Sarcodite within 3 of bottom
mouth deeply trilobate  about 7. Pseudopods 1 to $1\frac{1}{2}$ wide.
Lat dark sienna color, circular in transverse section,
with an indistinct areolar structure. A lighter colored one,
measured 20, 12, 7, + sarcodite reaching within 4 of bottom.
A thin sac of same kind. (No 5H)

Oct. 8. The *Neleizorn* examined yesterday. Still in active condition. As it moves it occasionally raises part of the court sometimes thus: (at other times thus:) in latter case assuming an arched position, the lifted portion forming narrower end of the form. Contents of fine granular matter with many globules from $\frac{1}{2}$ to $1\frac{1}{2}$, mostly about 1 (with 1/10 W). In focusing for the centre this appears paler and to consist of a nucleus of fine granular matter without globules. Some of globules few in number as much as 2 perhaps down some detached rays exhibited disks at end scarcely elevated.

Another individual meas. 16 diam with soft rays extend even to 25 thin granular & exceedingly delicate. The lenticular lines forming the court appear to be distinct from the minute disks of the rays and are 2 or 3 times as long as wide.

Oct. 13. In ditch water from Cranberry swamp Abrecom. Abundance of *Difflugia pyriformis* passing into *D. acuminata* 008000. Also *D. spiralis*. One seen with neck of pellets & body of stones - see drawing of late. also one covered with flat transparent plates of granules and diatoms mostly separated by single row of small particles, as seen in a trilobate dif. in the winter.

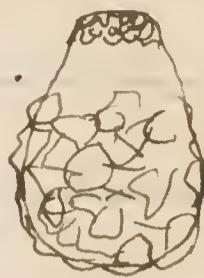


Large balloon-like Arocella with capped surface
Large *Endothrix alveolata* abundant.

Abscom pond. Abundance of large *Diplopia pyriformis*, of large stems, & very uneven, with sacule seen through body of test of grass green color.

Smaller stems near mouth 90-60-17 with No 7

Trans. section circular, w. 60 by 60.



Another more elongate form, of comparatively even surface, and colorless sacule except such color as derived from food, which usually appears yellowish

[Drawing] 65 long 26 broad, & 10 at mouth. Section circular.

Are these two different species.

Large *Firmina acinus* and *F. globularis*.

Euglypha alvadata. Form seen with six long divergent spines to fundus thus: ☼ as seen beneath.

Arcella. Home like form, eight sided & shelving wif 47 high 45 wide, elevation of mouth 5, 22 broad where evated. mouth 16 crenate. crenations about ~~toothed~~, not regular. Arculae of tent about $\frac{3}{4}$

Oct. 17th *Nebela carinata* Sphagnum

Abscom to Wales = 65-42-12 lateral view 65, 18, 7. carina 5 deep extending to within 22 of mouth. Structure of carina very indistinctly of minute arculae scarcely 1 diam.

Another form Abscom pond. See drawing of date viewed with No 75:H.

Euglypha. [Drawing] fragment from in Abscom Sphagnum
4 wide
10 wide whole length 35 with No 75:H.
6 long

A living Leucodonta observed in association. Nucleus appears uniformly granular. Abundance of *Torula acinus* and *T. globularia*. A test of former with circular medae having beaded outlines, in some cases where separate these beaded outlines appear independent of one another thus: 

An apparent nucleus seen in decapsizing sacule of *Euglypha spinosa*, 5 diam with 10/10 water, uniformly granular.

Hyalolampe  Abscess pond water 1/10 water
21 dir, interior body well defined 16 diam. Rings of ext. stratum 1 diam. The layer about $2\frac{1}{2}$ thick. Interior pale straw color with much luminous food & clear granules. Army food were three brown spores thus: 
Animal slowly glided along, but failed to detect rays if such existed.

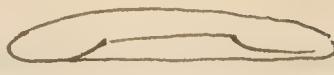
Saw several 'Dif. spiralis' built of thin plates partly stony & partly diatoms? with narrow interrupted intervals. Interruption apparently produced by rounded clear granules.

Actinophrys viridis. Alcock Pond water
Oct. 18. Body bright green, finely granular
green with darker green balls or spots;
28 diam. Rays minute in number, granular
to 40 in length. Two ext. ver. about 6 diam.
Body so opaque that it appears finely granular
yellowish green throughout to its very borders
with darker scattered green spots. (No 5. H.)

Achela carinata Viard under 1/10 Wale. The
rete in one focus appears as a black line or
set of lines with round or oval or other formed
meshes shaded centrally; in another focus
as light lines with the meshes polygonally
rounded and the centers shaded.

Saw a *Limnaea acinus*, dark sienna colored.
Euglypha spinosa. Append. to have a
pale faintly granular nucleus 10 diam.
with nucleoli 2 diam. On or within the
nucleus were three other similar pale
spots observable, whether nucleoli or
exterior vesicles undetermined.

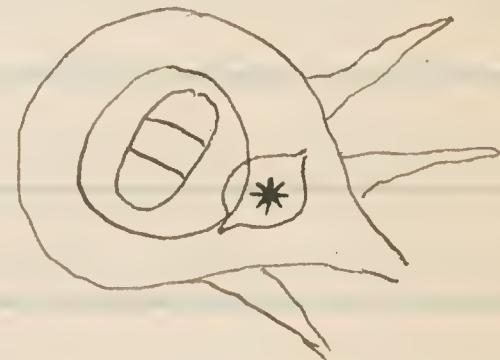
Arcella - discin' Atco, N.J.



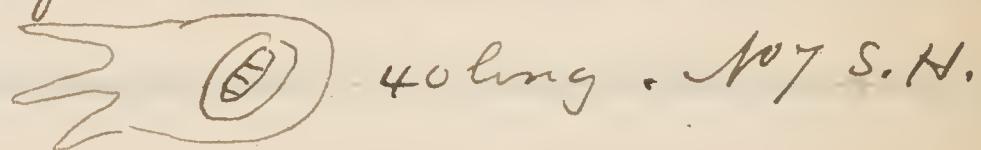
Breadth 42 height 9 elevation of mouth 3 width do 16

Anuclea radicans. Occupying space of 30 by 30
contained three joints of *Didymosrium Gracillium* in
a vacule or else bounded by granular mass of the
usual gelatinous investment.

The vacule 17 by 15. The three alga
joints fresh & green 15 by 8.



An isolated joint of the Did., not enclosed in a vacule
meas. 9 diam & endochrome reduced to centre of a
small disc brownish stem 5 diam. This joint was
shortly after observation discharged. Other contents
consisted of a number of small greenish & brownish food
balls: about 3 diam. Also colorless granular foodballs?
same size. Horn or pic C.V.S. amount 2 or one,
from 2 to 5 diam.



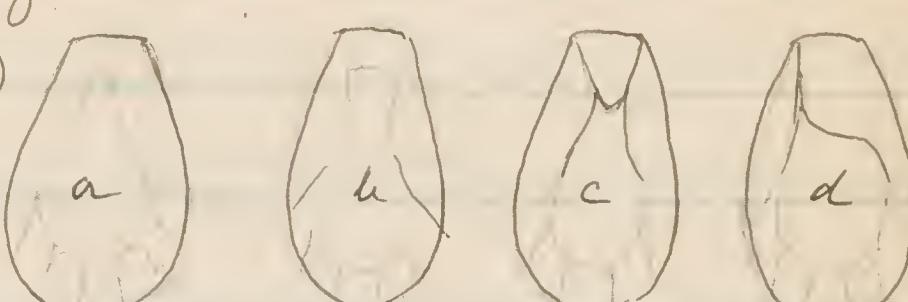
1878 Jan. 5. Water with Cresses from Darby Station Spring, collected Dec. 1877.

A fine large Amoea quadrilineata. Anther with 6 lines, & perfectly colorless Arcella, with two nuclei, opposite and at periphery, hemispherical 20 broad, 10 thick (10W) have not pointed, with 5 elevation. Sarcide colorless, c.v 2 to 2 $\frac{1}{2}$. Sarcide oval 15 resting on funnel of mouth, attached by third to papilla of shell. Limax-like Amoea 30 long & wide protein snakelike which like man dirt adhered a cut vesicle enlarged from 3 to 4. Contained two elevations 7 long also a number of crystals, apparently starch grains and nucleolar matter changes of form. (Mean 1010W)

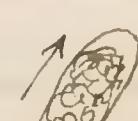
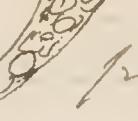


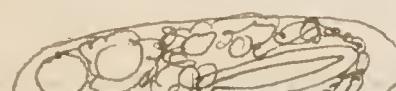
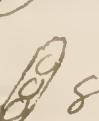
Supposed to be young of A. proteus. O crystals elongated to 35 by 8 at end. Snakelike not distinctly villous. A nucleus 2 or with halo 4 div. At times two cut vesicles to 4 associated with former saw an Ornatomea testicula-canda for which see Downing. With these also many small Amoebae of various forms. Also Trinema of several varieties, some unsymmetrical form. Also Amplizonella, the double contour not visibly dotted.

See succeeding page but one of March 31.

Jan. 12 *Kyalosphenia cuneata*. In water
from Darkley station spring. See drawing of date
Sarcide was rare form, on disturbance detached
itself from mouth and
retired as in a, then 
slowly protruded again
widening at end as in b. Projected one and two
tentacles, after disturbance retracted as in c
retaining connection with mouth by two threads, after-
ward retracted one thread remaining connected
by one as in d. Nucleus 5, with five
pale nucleoli of which three measured $1\frac{1}{2}$ the
others 1. Contractile vesicles two or three, close
to nucleus and just below it laterally; expand
to twice before collapse - all movements exceedingly
protracted. Coarser oil like molecules just below
nucleus, some of intermediate size seen along
border of fundus. Length of test 26 long 20 broad, 6 thick
5 broad at mouth. In section poles appear polygonal
as in figure. Sarcide in this view appears pale
yellowish. Nucleus appears faintly granular
and like one the nucleoli.

Jan. 16, 1878 Water Darley Station. Meas. No 7 S.H.

Small Amoebae clavate or limaciform.
Moveant with thicker end forward by
projection of the ectosarc with attendant but
 retarded influx of the endosarc 
Moveant to one side or other by  projection
of ectosarc in corresponding direction.

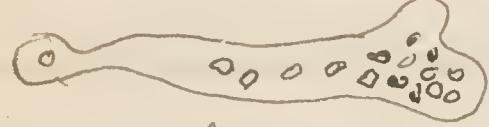
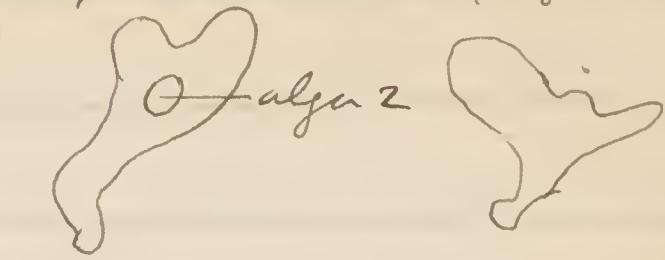
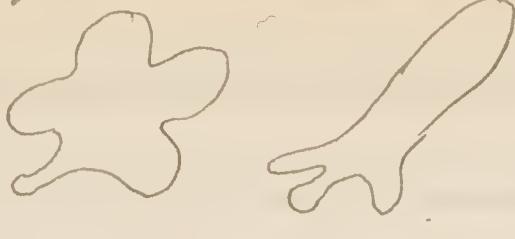
 One 20 long & broad, contained a
diatom  & $8\frac{1}{2}$ with three interior endochromic masses
enclined in an elliptical vacuole thus: 
cont. vesicle 2 nucleus $1\frac{1}{2}$ not readily distinguishable
from other granular spheres with it.

March 31, 1878

Same water as above. Meas. No 10 Water.

The small limaciform Amoebae with
posterior villous disk. Sarcode finely granular.
From one to three contractile vesicles, about 1 div.
sometimes all in the villous disk, often absent for
a time. Nucleus not present or at least not detected
He contained crystals, which generally held in
advanced position, often accumulated at one
part, rarely contained *Protococcus*, though
abundance of them* absent, nor did anything
adhere to the villous disk. Amoebae from
20 to 35 long 6, 7, 8, wide at free part, disk 3 or 4 diam.
Crystals $\frac{1}{2}$ to $1\frac{1}{2}$ long. a large one $1\frac{1}{2}$ long 1 broad $\frac{3}{4}$ thick

Some appear as square octahedron, others as hexagonal plates.



These Anneline appeared but little disposed to eat; they passed & passed the Puccocci without noticing them. Occasionally an individual was seen with one in the interior green or reddish. Sometimes assumed an irregular undulate form.

June 15, 1878. Tuft of moss from bricks in my yard, moistened and immediately examined. No 10 Wales Inn.

Trombicula acinus abundant

Euglypha alveolata, minute, no spines, six points to mouth, areolae of test not obvious or indistinct, animal nutr., retracted nucleus with nucleolus generally distinct, sometimes divided up into a uniformly granular mass. Surrounded by bright oil-like molecules. 8 to 10 long 5 wide 3 at mouth.

Nucleus 2 $\frac{1}{2}$ nucleolus 1. In one in which the nucleus was granular the nucleolus still remained distinct thus

Difflugia cassier

Anoeba quadrilineata.

Anoeba minute, with a pulsating disk.

In *Anoeba noruosa* 30 & 25 At first seen completely motionless & with no pulsating vesicle, several food vacuoles & particles of food. nucleus oval 8 by 5. Saw a thin soft c.v. Remained quiescent for several hours without motion. In all the

The nucleus appeared oval, granular, with more distinct and uniform granules just within the periphery, thus section appeared thus : 



One of the indiv. of graduate form next summer was male
oral and meas. (with No 754) 20 by 18 the nucleus 5 by 3,
and a C.V. neare't 5. Completely glistening and shiny.

One of another oral form just rising was 28 by 15.
The nucleus 6 by 4. The contr. vesicle 6 which after 15 minutes
had expanded to 10



An. vernacula, seen June 16th - also ginecent & no C.V.
measured 16 by 16 - with No 7. singularly graduate. I think
the C.V. applied only to 5 & the others had. I am not
surely clear from the C.V. applied or not applied; in
which case it which was measured is not necessarily

A little *Vincenza* with mouth almost terminal
thus \square 5 by 2½ oral and 1½ mouth, 1 incisor of dorsal

The little Eulyphaea from the yard with spines to
mouth often appear as if covered with minute rectangular
plaques as in Shunk's D. Shannonianus &c.   ^{My no 7} 9-5-4

Trinuma 9-4 (with Nales No 10) exhibited 2 p.v. about
1 mm. at side of nucleus. One 13-7-3 thus  plates at side
of nucleus. One seen 13-7-3 No 10 w. with nucleus 3 and was compressed
thus:  Nucleus with five nucleoli thus: 

Difflugia cavis of the mss of parments, frequently
of a decidedly yellow ferruginous hue. Abundant.

June 24, 1898 Scum of *Euglena sanguinea* & *vinosa*
collected from surface of inundated bog on Sch. R.
below First. Garden previous day Sunday June 23.
Contained a profusion of *Arcella vulgaris*, all
shades from bright amber yellow to dark
chocolate brown. Usually 2 nuclei opposite
a number of p.v., often air bubbles. Pseudopods
up to 14 or more extended at same time beyond
lateral borders, 5 seen at once in all directions
thus , often pointed, variable in length
& thickness. Meas. with $\frac{1}{5}$ W.

18 broad mouth 5 dark brown, an air bubble 8

17 " " 5 " " "

18 " bright dark amber. 5 ps. to 10 long

11 " 4 brown

10 " 4

16 " 4

16 " bright yellow amber with obscure

17 " 5 do do do

Ambers with halo 2 without 1. puls. res. $\frac{1}{2}$ diameter

10 wide mouth 4 bright yellow

16 wide " 5 brown

16 colorless - white and

From perfectly colorless, through all tints of raw sienna or amber colored to deep chocolate brown, and 10 in breadth to 18 in breadth with mouth from 4 to 5 & rarely 6, nearly hemispherical, even, about half the height of breadth, border of base usually somewhat excised. Nuclei 2, pulsating vesicles 3 to $\frac{1}{2}$ a dia. Nucleus 3 div. with halo 4. p.v. to 3 or 4 diam. Food contents, often form the contents of *Euglenia sanguinea*, especially starch-like or oil-like cupricles, colorless & shiny, also green and red granules. Occasional a ball containing an entire *Euglenia viridis* would wail in form. Radspds from 5 to 10 beyond outline; sometimes as many as 14 counted - digitiform, often tapering & even filamentous toward end; usually simple occasionally fuscate near base.

Shell circular in outline, rarely liseant shaped or bilobate.

Saw an Arcella only 10 diam. with a digitiform @ grandspd 15 $\frac{1}{2}$ 2 protruded thus
@ shaped or sickle 5 high.

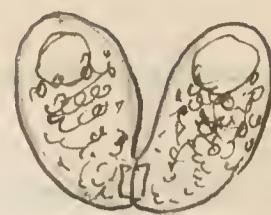
A colorless one 16 diam. full of green algaous food; the algaous grains being from $\frac{1}{2}$ to 1 diam. Shell generally about half height of breadth or a little less.

A number of the Acillae contained between the protoplasmic mass and the sides of the shell 2 or 3 to ~~as~~^{as} a dozen or more oval or elongate oval containing granular, anucleated cupules for 2 to 3 mm by $\frac{1}{4}$ to 1 mm, when round about 2 diam. Are they parasites, or reproductive bodies. There present in very many of the Acillae *Annelia vermiformis* & its *A. quadrilineata* very abundant with Oscillaria, in mud of Brok. Garden bog.

Minute green Actinophrys 7 diam with 10 W. contractile changes from, rays about equal to diam. of body, ungranular *Anthonia colorata* 5 diam. tan p.v. oppinn. rays to twice length diam. of body. Abundant with *Hydrodictyon*.

In moss from ground. See drawings of June 22d 1838. Met repeatedly with animal cinctus of four ova-like bodies associated together - more or less disk like in one view. Each body oval, uniformly granular, colorless, with a pulsating vesicle. Nucleus probably existing & central though not positively determined. When first seen the granular ova-like masses, closely situated, but finally become sinuous, & the puls. ves. ceases its action so becomes exceedingly slow. One body preserved in an. cage next morning was not to be found, but observed several acineta which were supposed to have been derived from it.

Aug. 18, 1878. Small Euglypha and Linemata in great abundance in moss from yard.



Two Linematas seen in conjugation thus:

Both distended with contents.

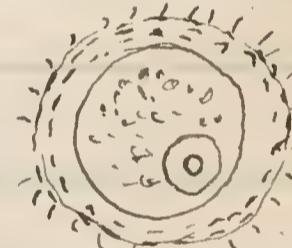
Difflugia cassis, variable in proportion of length to breadth, sometimes uniformly contorted, sometimes twisted with heavier ones at fenders, sometimes around the mouth. Usually of a yellow color.

Aug. 24, 1878 With Spirogyra from the fountain in the

garden at Fairmount. Echinocystis with short nail-like spines. $\frac{1}{10}$ W. 15 diam.

Nucleus? 4 nucleoles $\frac{1}{4}$. Colorless; motionless; 200 soft rays.

2 Another 17 diam. with an inner ball 12
a nucleus as in former, with colorless rays with a
few greenish granules.



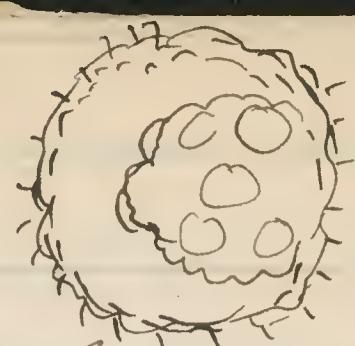
3 A third: 16 diam. like first. nucleus only 3 with nucleoles $\frac{1}{4}$.

4 A fourth same as the second 15 diam with inner ball 10.
nucleus 4, a vacule 4. No green ch. in the ball.

5 Another 14 diam, like the preceding with inner ball
8 by $7\frac{1}{2}$, nucleus 3 - granules colorless, a vacule 3

6 One of 16 with an inner irregularly spherical mass
resembling body of Actinophrys, which shuns change
form. Contains a number of vacules, of which several

appeared to contract & collapse on the surface. Shortly after first seen the inner ball became regularly smooth and glistening when it appeared as in Thos. # Another 13 diam with inner ball of 8, nucleus 3.



Sat. June 7, 1879 An individual of general purplish hue. Sphagnum. Malaya Cedar Swamp.

Spherical or ovoidal, stationary, very sluggish, usually emitting from one pole mostly three pseudopods, digitate, blunt or pointed, often irregular. Nearly opaque from the purplish black or inky hue bears a decided purple color which appears to depend on the dark purple granules of the endosarc. The marginal ciliare trumpet out probably clusters but appear to have a pale violet tint, probably due to reflection from the purple granules of the endosarc. The granules of the latter extend with sorts of pseudopods to $\frac{1}{3}$ or $\frac{1}{2}$ their length. The body contains spheres & materials of a pale brownish hue probably food but the purple granules render all else sterile. Could detect neither nucleus or cent. vesicle.

Six diameter 20 without pseudopods & nearly spherical as in (c) 20, 18 with three pseudopods as in fig. 2 - 24-18 as in fig. 6 20-18 fig d. with $10\frac{1}{2}$ L.

1885

Aug. 15 Trip to Newport, R. I. to visit Dr. Wm. Pepper. To New York & thence by steamer boat arrive Aug. 16th 7 A.M. Same day drive 5 m. up the coast & take sail boat 5 m. to 'West Island', resort of a fishing club. Guest of Dr. S. W. Mitchell. Island of red granulite. Return to Newport 17th.

In company with Dr. P. visit A. Agassiz laboratory.

Aug. 18 Dine in comp. with Prof. Gibbs, Jr. Wharton, Col. Waring &c and in evening meet Baron Osten Sacken. Aug. 19 Visit Mr. Jos Wharton on Conanicut Island. Evening 9 p.m. leave in Newport boat for New York & arrive Aug 20 7 a.m. Take horse car on Broadway to 14th St. to Tiffany & Co.

Large collection diamond crystals. Kunz's saffron-like meteorite. Take elevated rail 'Harlem train', 14th st station and 6th av. to 81st for Natural history Museum. Return from 81st station 9th av to Buitrandt St. for home, New York at 6 o'clock. 'Dr. W. Pepper 15 Greenwich Place.'

In a brook at Newport near place of leaving for West Island observed numerous *Planaria maculata*, *Poecystyla fluvialis*, *Clepsine*, larvae 3 species, the curious oniscus-like larva of the beetle '*Psephenus*'.

Poecystyla 6 to 8 lines, milk white with brown intestine or sometimes nearly colorless.

Planaria maculata, nutty uniform chocolate brown above and translucent dusky whitish beneath. With a colorless spot at base of the auricle



1885

May 23. With family removed to Wallingford.

June 8th Trip to Cambridge, Md, joint with his wife Dr. Rothrock; idem yesterday. Examined a tertiary clay and sand deposit filled with shell casts, barnacles & mollusks. Horizontal bed exposed on shore of Bay. Returned June 9th.

June 10th. Commenced annual examination Swarthmore Evening dined with C. E. Smith, Dr. Lewick in company June 16th. Commencement Swarthmore College.

June 20th On invitation of Joseph Wharton. Trip to the zinc mines of Friedensville, and the Steel & Zinc Works of Bethlehem; in latter case of Sussex Co. N. J. alone used in making zinc oxide & metallic zinc Swarms of the 17 year Cicada in vicinity of Bethlehem. scarcely any at Wallingford.

June 25th Trip on invitation of Dr. Hall, in company with other physicians to visit Emory Cottage, Board of Franklin Asylum, at Atlantic City. Journey to Danvers, Hinsdale, Lewick, etc. June 26th Visit to Wilcox at Glenold, Media where the 17 year Cicada swarmed, while there were very few at Wallingford.

June 27th Examination of egg deposits of Cicada. Ure? to deposit eggs only in the stems of the

preceding year. Eggs arranged obliquely 0000 in two rows in the receptacle of the woody tissue. In two receptacles of same stem counted in each 16 eggs. In another stem in one receptacle 14 eggs. In one of a cherry stem 24 eggs.

In ovipositing the instrument introduced is the stem obliquely down through the bark into the wood to the depth of about half an inch. The passage is somewhat curved the innermost part being nearly or quite vertical. In making the receptacle the woody fibers are split apart entirely, then the

receptacle for the eggs being about 3 to 4 lines long.

The oviposition takes place both down and upward, not stems in the former direction.

The eggs laid close together, but separated laterally by elements of wood tissue.

Observed a number of Cicadas, alive and clinging to stems, entirely deprived of their abdomen. On the ground everywhere at Idlib and also Bethlehem observed among the dead & mutilated cicadas multitudes of isolated abdomens. Birds appear to eat the thorax and head of the males & reject the empty abdomen; appearance full air only.

1887 April 29 collected some bark fragments of pine
with *Pterostoma viridis*, at Gloucester, A. J. Placed in
a glass on the table - May 24th noticed on the same
about 10 larvae of a Psocid, which had apparently,
hatched from eggs on the bark - May 29th Same
observed in imago state, & preserved in alcohol.

May 28th Received from Mr. P. Seal a few oz. phial
with numerous Rotifers. Transparent, whitish, with
yellow stomach. Cnical, vase like, single eyed.
from 0.375 mm to 0.5 mm long with a dorsal and
ventral cnid prominent. Occasionally retracted
the crown and protruded a pair of lateral cnids
when animal was as broad as long. 
viviparous. Observed one give birth to
a young like the parent and two third as large.
Probably *Asplanchna Ebbesbornii*, Hudson.
Jour. Roy. Mic. Soc. VIII 1883, 621, Pl. IX, X.
Received a letter from Mr. Hudson Aug. 4, 1887.
declaring the above to be new species.

June 3, 1887 A peculiar looking *Tacina* submitted
by Dr. George Preston No. Baileyahe, U.S. M. No. 8.

4545 McCleam Ar. Discharged by Robt Hutchinson.

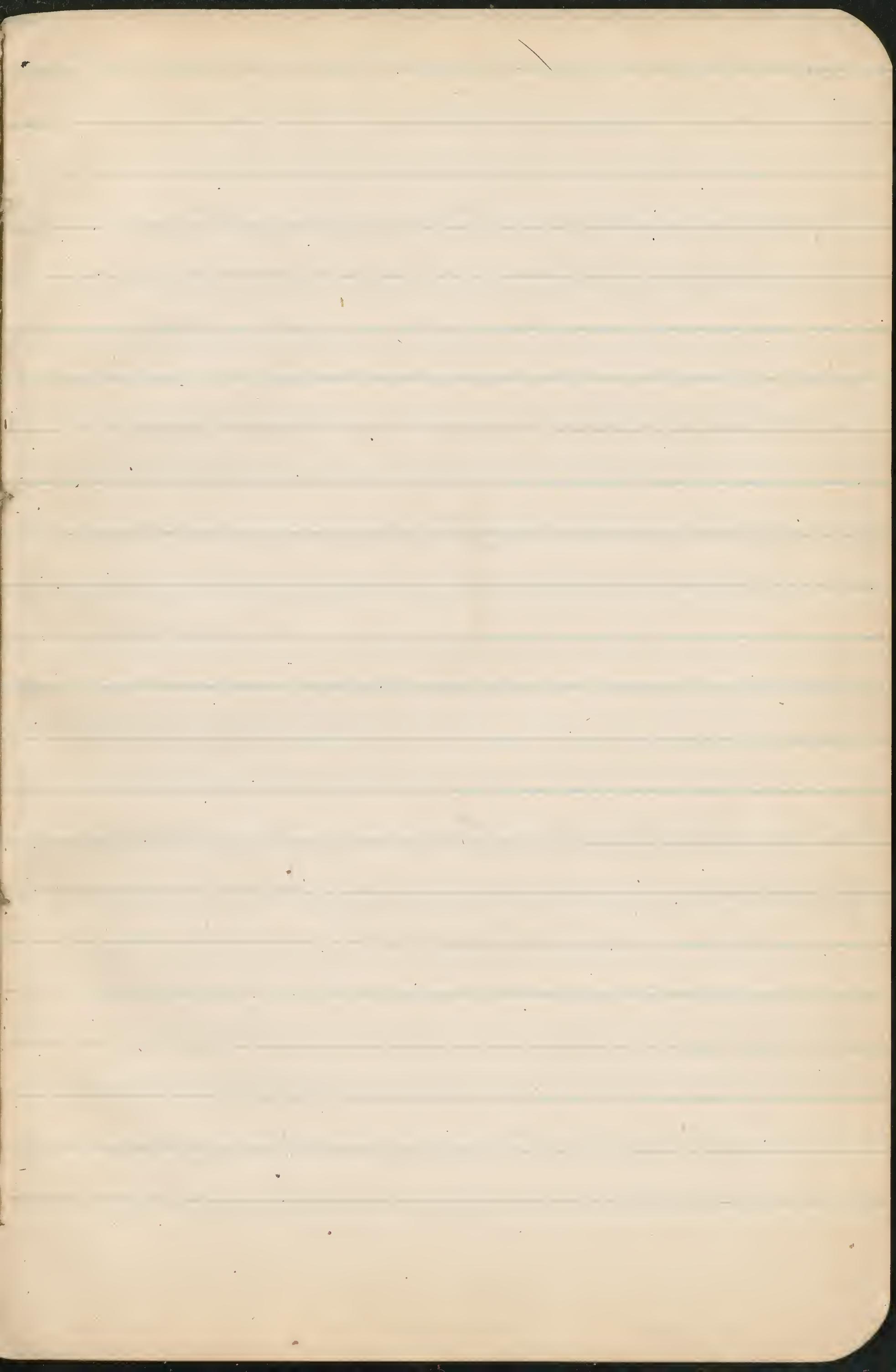
No head! In fragments as follows: 22 in., 33, 23, 7, 9,
12, 10, 4, 4, 5, 2 $\frac{1}{2}$; seven pieces together 8 in., nineteen large
joints together 14 in. = 15 $3 \frac{1}{2}$ inches.

Piece of 22 inches of 32 segments from $\frac{1}{2}$ an inch to 1 inch
long by 1 to $1 \frac{1}{2}$ lines wide. Piece of 33 inches with
36 segments 20 to 24 mm long by 2 mm wide.

Generative aperture marginal, near posterior third *
of the segment, pigmented. Or rather joint posterior to the
middle.

A piece of 3 segments measured 66 mm long. 1st joint 22 mm
by 3 mm wide; 2) 18 mm by 2 in front & 4 behind; 3) 25 mm by 2.
Aperture pigmented.

? Is it a narrow-jointed variety of *Tacina saginata*. The
mature joints to 1 in. long by $1 \frac{1}{2}$ lines wide.



MS. 278

P.H.L.A.

NAL. SCL

PODCAST



